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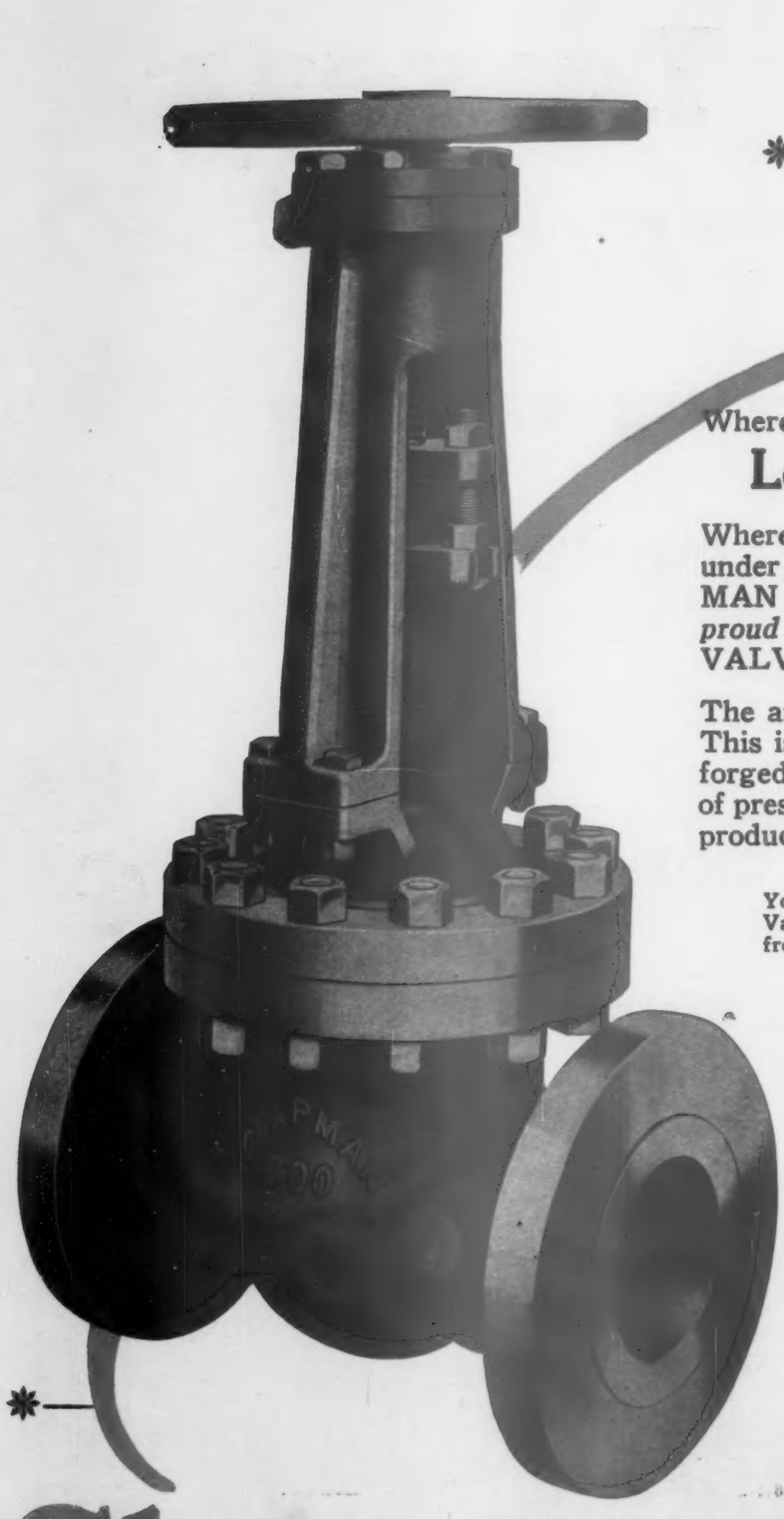

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# Better Outlook in Crude Oil Situation

**Highest daily average estimated total production in 1927, week ended July 30, 2,587,105 bbls. Lowest in 1927, Jan. 22, 2,360,789 bbls.**

## Decision to Develop Seminole Conservatively and Probable Curtailment in California Important Factors

By Andrew M. Rowley

**Highest daily average estimated light oil production in 1927, week ended July 30 2,102,385 bbls. Lowest in 1927, Jan. 1, 1,790,729 bbls**

Further improvement in the general petroleum situation seems assured with the decision to develop the area immediately south of the Greater Seminole Field in Oklahoma in a slow and conservative manner and the prospect of success of the movement in California to shut in an additional 50,000 or 60,000 barrels daily of production to prevent further wastage of natural gas and bring the output of low gravity crude more in line with market requirements. This conservation movement in California will aid the industry in that State and will have its effect upon the general situation while a postponement of the time when new production may be expected from the Seminole area has a most important bearing upon the whole situation in the Mid-Continent.

With gasoline stocks in the hands of distributors low and the time at hand when refiners are expected to prepare for the increased spring and summer demand, crude oil requirements will increase materially within the near future. And, during that same time, production of high gravity "sweet oil" in the Mid-Continent area will continue to decline. By the end of March it is believed withdrawals from storage in Oklahoma and Kansas will total a substantial figure, further strengthening the general situation in that area.

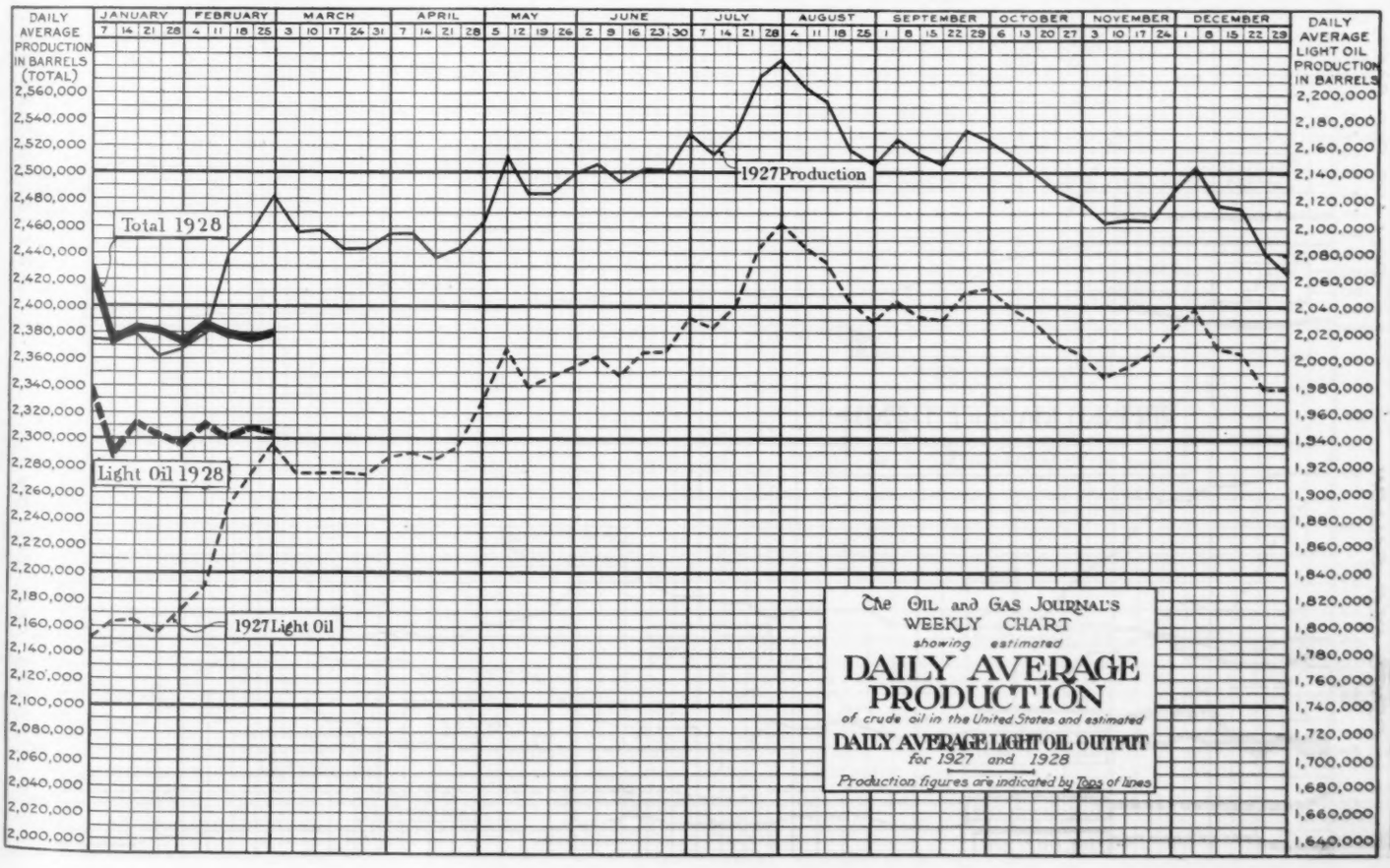
Efforts to hold production of crude oil more in line with market requirements is one of the important factors at this time in the entire situation. Indications of the success of these efforts are the basis for the feeling conditions as a whole will show material improvement this summer. Operators in the Seminole area in Oklahoma have rendered a great service to the industry in showing what can be done and credit is due them for the better outlook in the situation in the Mid-Continent area.

### PRODUCTION IN THE UNITED STATES

Estimated daily average production of light and heavy gravity oil in the United States for week ended February 25, and a comparison with the previous week follows:

| | Feb. 25 | | Feb. 18 | |
|---|---|---|---|---|
| | Light | Heavy | Light | Heavy |
| **Oklahoma—** | | | | |
| Tonkawa | 15,530 | ..... | 15,790 | ..... |
| Burbank | 44,825 | ..... | 43,265 | ..... |
| Other Osage Fields | 29,505 | ..... | 29,580 | ..... |
| Cushing and Shamrock | 21,155 | ..... | 20,920 | ..... |
| Bristow and Eastern Bristow | 24,835 | ..... | 24,885 | ..... |
| Seminole | 306,910 | ..... | 318,740 | ..... |
| Northern Miscellaneous | 155,470 | ..... | 154,570 | ..... |
| Southern Fields | 60,590 | ..... | 60,565 | ..... |
| Total Oklahoma | 658,820 | ..... | 668,315 | ..... |
| **West Texas—** | | | | |
| Hendricks | 134,549 | ..... | 117,786 | ..... |
| Yates | 48,308 | ..... | 47,917 | ..... |
| Remainder | 127,812 | ..... | 133,547 | ..... |
| Total West Texas | 310,669 | ..... | 299,250 | ..... |
| North Louisiana | 36,960 | 7,965 | 37,385 | 7,950 |
| Arkansas | 20,055 | 67,680 | 20,275 | 67,985 |
| North Central Texas | 126,862 | ..... | 127,286 | ..... |
| Texas Panhandle | 74,145 | ..... | 77,855 | ..... |
| East Central Texas | 25,100 | ..... | 25,262 | ..... |
| Kansas | 110,680 | ..... | 109,885 | ..... |
| Total Mid-Continent Area | 1,363,291 | 75,645 | 1,365,513 | 75,915 |
| Gulf Coast | ..... | 119,183 | ..... | 112,864 |
| Southwest Texas | ..... | 27,309 | ..... | 26,677 |
| Eastern | 105,500 | ..... | 107,000 | ..... |
| Rocky Mountain Area | 74,887 | ..... | 74,739 | ..... |
| **California—** | | | | |
| Santa Fe Springs | 38,500 | ..... | 38,500 | ..... |
| Long Beach | 117,000 | ..... | 118,500 | ..... |
| Torrance | 2,500 | 17,000 | 2,750 | 17,000 |
| Huntington Beach | 58,000 | ..... | 59,000 | ..... |
| Dominguez | 12,750 | ..... | 12,750 | ..... |
| Inglewood | 19,000 | 12,000 | 19,000 | 12,000 |
| Ventura Avenue | 54,000 | ..... | 53,000 | ..... |
| Seal Beach | 40,000 | ..... | 39,000 | ..... |
| Remainder of State | 59,750 | 185,000 | 59,750 | 185,500 |
| Total California | 401,500 | 214,000 | 402,250 | 214,500 |
| Total United States | 1,945,178 | 436,137 | 1,949,502 | 429,956 |
| Grand Total | | 2,381,315 | | 2,379,458 |

→ **Total Increase, 1,857 Bbls.; Light Oil Decrease, 4,324 Bbls.** ←



# Oklahoma Fuel Oil Prices Advance

## Active Demand Brings Higher Quotations Despite Reduction in Low Gravity Crude Schedules. Heavy Kerosene Movement

By W. T. Ziegenhain

. The Oklahoma Group 3 refined oil market was featured by higher fuel oil prices despite the crude price reductions on the heavier grades a week ago. Refinery gasolines and natural gasolines were being firmly quoted by a majority of the refiners and manufacturers who anticipate a further strengthening. The demand of the past week was not sufficient to justify an immediate advance.

Kerosene was generally weak despite the removal of more than 800 cars of that material from the Mid-Continent for export, over the past month, which in turn, emphasizes the weight of the large stocks being carried by refiners. With the exception of wax, which showed a further advance in quotations the balance of the products were generally unchanged.

Various explanations are given for the present strength in the Oklahoma fuel market, when admittedly there is a surplus of that product outside the Group 3 marketing territory. The Atlantic Seaboard has been more than adequately supplied from refiners running Venezuelan crudes there and has forced California refiners to store a great portion of the material which would have found its way to the East Coast under normal conditions. Of greater importance is the cutting of heavy Mid-Continent crude prices on February 21, which was interpreted at the time to mean that lower fuel oil prices were assured.

### Fuel Oil Situation

In face of these unfavorable factors fuel oil has strengthened and refiners report the demand will justify additional advances if it continues over the first part of March. Others contend the present demand has been prompted by the greater activity of the steel industry and industrial buyers have hurried to close contracts for deliveries over the future, principally as a result of the optimistic outlook for refined oil prices in general following the readjustment of the crude prices.

Still others point to the better conditions in the fuel market as due entirely to the withdrawal of a major producer from the spot market during February, giving the market a chance to strike a better balance between supply and demand. It is understood this manufacturer has again entered the spot market and while continued strengthening has followed this, the March fuel market is not being viewed with the same degree of optimism that prevails in this immediate market.

### Fuel Contracts

The fuel market has been given considerable attention lately, due to the discussion of railroad contracts for material over 1928. Some contracts have already been closed while others are in the making but the general impression prevails that considerable spot fuel will continue to be purchased by the railroads. The terms of these contracts vary somewhat but are said to be generally more favorable to the railroads than those made last year as might be expected. Those contracts providing a variable price depending on the posted price of Mid-Continent crude have generally taken 85 cents per barrel as the base price in Oklahoma specifying an advance or decline in the price amounting to 60 per cent of the price change on 36 gravity Mid-Continent crude oil as posted by the Prairie Oil & Gas Co. The base price in Kansas has been from 5 to 10 cents higher while in North Texas it has been from 80 to 85 cents. Another form of contract is said to have been offered in Kansas and specified a flat rate price of $1.07 per barrel over the year and one refiner is understood to have accepted this in preference to other forms.

### Gasolines and Naphthas

While reports of U. S. Motor gasoline

(Continued on Page 220)

### REFINED MARKET BAROMETER

Little change in refined oil prices resulted from the posting of revised crude prices in the Mid-Continent last week. In general, conditions favor a slow advance in gasoline prices in all refining centers, but fuel oils continue to be weak at all points except in the Mid-Continent. Natural gasolines moved slowly, and while prices were maintained at last week's level, there was scattered offering in the Mid-Continent carrying price concessions. The California natural gasoline market remains unchanged. Diesel fuel was reduced along the Atlantic Coast despite the better feeling prevailing there regarding the market in general. Wax was unusually strong in both the Eastern and Mid-Continent refining centers, and prices were advanced.

**Mid-Continent**—Higher fuel oil prices featured the market with the movement of other oils merely holding prices at last week's level. Both refinery and natural gasolines are being more freely offered, but there is little thought of price reductions just at present. Gas oil was in better demand. Lubricants moved slowly and the cylinder stock and bright stock market weakened as persistent offerings were made by outside refiners to the Oklahoma trade. Wax was strong.

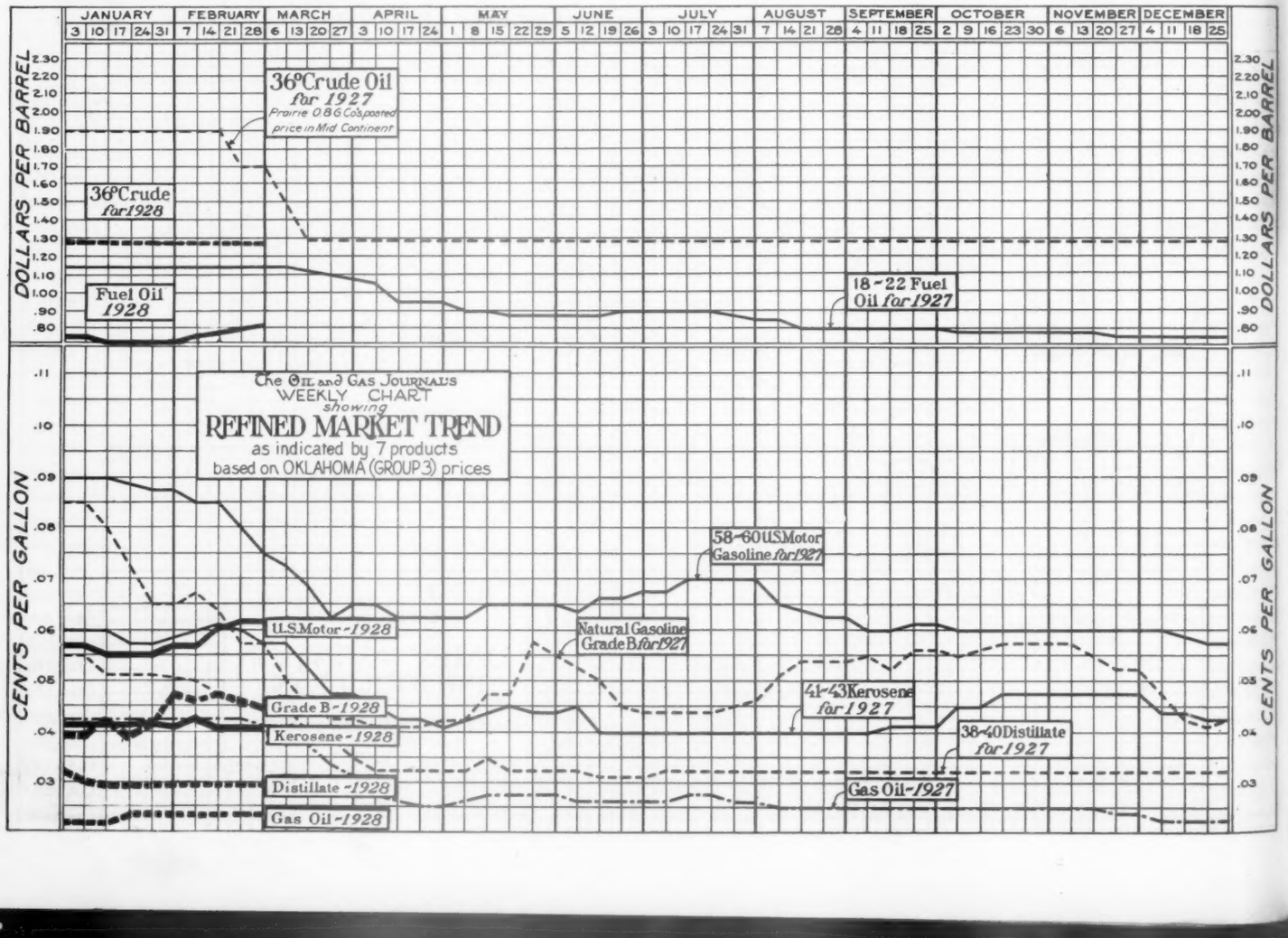
**Atlantic Seaboard**—While most refiners viewed the future with a little more optimism, there was little thought of boosting refined oil prices immediately. Diesel fuels and kerosene continued very weak. The balance of the oils remained unchanged. Wax demands strengthened and higher prices were being quoted.

**Chicago**—Marketers are waiting until after March 1 to buy their later requirements. For this reason the demand has been below normal. Distillates and kerosene were particularly weak.

**Pennsylvania**—Little change is seen in this market as the demand continues to increase, pointing to a possible slow general advance in prices over March.

**California**—The export movement of gasoline improved, but the domestic market is more than well supplied. Fuels continue weak.

**Gulf Coast**—Prices remained unchanged as only a normal amount of trading was done.



# Sulphur Problem Less Serious-Egloff

## This Element in Gasoline Declared at A.I.M.E. Meeting to Cause Corrosion Only at Temperatures Near Zero

NEW York, Feb. 25.—The statement that the sulphur problem presented by the increasing production of crudes with high sulphur content in West Texas and the Panhandle is not as serious as is generally believed was made by Dr. Gustav Egloff, of the Universal Oil Products Co., in a discussion of a paper presented by Walter Miller, Marland Refining Co., at the closing session of the annual meeting of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers here Thursday night.

The meeting closed with the annual dinner and the review session presented the high spots of the meetings held February 22 and 23, at which technical problems of the oil industry connected with production and refining were discussed from all angles.

A. W. Ambrose, manager of production of the Empire companies, was elected chairman of the Petroleum Division for the ensuing year and the other officers elected were as follows: C. R. McCollom, chief geologist, Union Oil Co. of California, associate chairman; E. O. Bennett, chief production engineer, Marland Oil

A. W. AMBROSE
*Chairman, Petroleum Division, A.I.M.E.*

Co., vice chairman for production engineering; Joseph Jensen, geologist, Associated Oil Co., vice chairman for production; Arthur Knapp, petroleum engineer, United Gas Improvement Co., vice chairman for economics; Lester C. Uren, professor of petroleum engineering, University of California, vice chairman for research engineering; and H. W. Camp, Empire companies, vice chairman for refinery engineering.

### Sulphur in Gasoline

Doctor Egloff, in his comment on sulphur problems, made the statement that finished gasoline containing .4 to .8 of 1 per cent sulphur caused practically no corrosion in engines, only a slight amount taking place during the colder months of the year. Sulphur in gasoline, he said, caused corrosion on an average only three months of the year in the northern states and none whatever in the southern states, corrosion taking place only at temperatures approaching zero. He stated further that the sulphur content of the crudes was a minor factor in determining the market value of the crudes.

It was also brought out at the review session that only 20 cents of the differential of about 60 cents existing between West Texas and Panhandle crudes and "sweet' Mid-Continent crudes of the same gravity represented the difference in quality, the remaining 40 cents being attributed to the added cost of transportation to refining centers.

### Hoover Is Honored

At the annual banquet of the American Institute of Mining and Metallurgical Engineers held prior to the sessions of the petroleum division, Herbert Hoover, secretary of commerce, was awarded the William Lawrence Saunders gold medal in recognition of his engineering services.

In a short address, Mr. Hoover said: "The exchange of engineering experience and scientific discovery between nations is one form of internationalism that is beyond any reservations. America has made notable contributions to this advance, and we have received more than we have given. We inherited knowledge from our European forbears and have at times imported foreign engineers. The engineering profession has in no small degree been responsible for decreasing hours of labor, lessening drudgery, increasing standards of living and stimulating initiative and invention.

"More and more the engineers are the administrators of great industry, instead of being responsible solely for the application of their technology. To them comes the human problem of relations between employer and employe, the relations between producer and consumer. Our problems of transportation, of housing, of communication and of use to our natural resources now require long planning in advance. We no longer have the right to think in terms of our own generation. A greater America for our children will in large degree depend upon the engineering profession."

### Demand Change in Laws

A feature of the meeting was a special session on overproduction in industry, with E. L. DeGolyer, president of the Amerada Petroleum Corp., as chairman, at which it was brought out that many industries are now face to face with overproduction problems almost parallel to those of the petroleum industry.

C. R. McCOLLOM
*Vice Chairman, Petroleum Division, A.I.M.E.*

Opinion expressed in the papers and discussions at this session seemed to be largely in favor of a modification of the antitrust laws to enable industry to legally curtail to help preserve the country's natural resources.

The situation pictured in the zinc industry, as an example of the similarity of conditions, is that in the past three years there has been a 15 per cent increase in output due to improved refining methods, and in the same period prices have fallen steadily, with the sharpest drop experienced in 1927. The supply now in storage is estimated at 8 per cent in excess of actual requirements. It is estimated a 33⅓ per cent curtailment would be necessary to correct the overproduction, but concerted action is prohibited by present federal and state antitrust laws. The potential supply is much greater than the actual, there being a big supply of low-grade ore in sight.

It was pointed out that a committee of Congress has been formed to study the situation with relation to the antitrust laws, and will report in 1929. No action can be expected to relieve the situation until that year.

### Potentialities of West Texas

F. Julius Fohs, oil geologist, in discussing the outlook in West Texas and the Panhandle, following the reading of

(Continued on Page 217)

# Refiners Consider Research Work

## Discussion on This Subject to Feature Annual Meeting of W.P.R.A. Next Week at Kansas City. P. M. Miskell to Retire as President

By C. O. Willson

A discussion of marketing conditions and the consideration of a co-operative research plan will feature the program of the annual meeting of the Western Petroleum Refiners Association which will be held Tuesday, March 6, at the Muehlbach Hotel, Kansas City. The annual election will also be held, with reports from those who have had charge of the association's activities during the past year.

The meeting will mark the retirement of P. M. Miskell, general manager of the refining and marketing divisions of the Empire Oil & Refining Co., as president of the association. Mr. Miskell has served as president for the past two years and has refused to be a candidate for a third term. No changes are in prospect in the official staff of the association which is headed by Howard Bennette, managing director.

The convention will close a year which in many respects has been the most successful in the history of the association which was first organized in 1914. The association's membership now includes practically all of the independent refiners in the Mid-Continent Field and some of the adjoining areas. The membership was increased during the past year when the remaining refiners in the North Louisiana group joined the association.

At the meeting Tuesday, C. L. Henderson, vice president of the Vickers Petroleum Co., Wichita, Kans., and a vice president of the association, will present a report concerned with the present market situation. Mr. Henderson and the marketing committee of which he is chairman has spent considerable time in a study of market conditions in the oil industry, particularly the Mid-Continent refinery and Middle West jobbing situations. One phase of this work has been the consideration of long-time contracts between refiners and their jobber customers.

At the afternoon business session, Dr. F. C. Whitmore will address the members on the subject, "Some Accomplishments of Co-operative Technical Research." This address will be of special interest to those connected with research work and plant operation in the Mid-Continent Field.

Doctor Whitmore is an outstanding authority on the subject which he will discuss. He is head of the chemical department of Northwestern University at Evanston, Ill., and chairman of the Division of Chemistry and Chemical Technology of the National Research Council with headquarters in Washington, D. C. As second vice chairman of the Central Petroleum Committee of the National Research Council during the past two years, he has had an important part in the distribution of the $500,000 research fund of the American Petroleum Institute.

Several members of the association

(Continued on Page 219)

### PROGRAM OF W.P.R.A. CONVENTION

Program for the Annual Meeting of the Western Petroleum Refiners Association, Muehlbach Hotel, Kansas City, March 6, follows:

*Morning Session—9:30 A.M.*

President Miskell's Report.
Report of Committee on By-Laws—George D. Locke, Chairman.
Annual Report—Fayette B. Dow, Washington Counsel.
Annual Election.
Report of Marketing Committee—C. L. Henderson, Chairman.

*Noon—12:30 P.M.*

Luncheon for Members.
Luncheon for Newly Elected Board of Directors.

*Afternoon Session—2 P.M.*

Address—"Some Accomplishments of Co-operative Technical Research," Dr. F. C. Whitmore.
Discussion—Led by Dr. Roy C. Cross.
Report of Research Committee—R. R. Irwin, Chairman.

*Evening—7 P.M.*

Kansas City Realty Board Dinner.

# Pottawatomie Now Scene of Activity

## More or Less Condemned Six Years Ago, This Section of Oklahoma Now Seems Designed to Get Extensive Play

By J. L. Dwyer

Time, the great corrector of all error, has done much to change the oil outlook for Pottawatomie County, Oklahoma, and gazing at the prospects of future oil pools of the State, it seems plausible that this county will eventually render its share of Wilcox sand oil, for at present it is one of the most active spots in Oklahoma.

It was less than six years ago that the prevailing geological belief based upon exploration, and the available data obtained from well logs, indicated that the Wilcox sand was at least 6,500 feet deep in "Pott" County, and for this reason leases upon land which could have been secured for a very reasonable bonus, were passed up in favor of other territories. The geologists were almost unanimous in claiming that Pottawatomie County formations were thickening, as one went west, and that in addition to this, the normal dip experienced through Hughes and Okuskee Counties was increasing in Pottawatomie County. All available information tended to give strength to this theory, but like many other regions the drill upset them, and knocked them into the proverbial cocked hat.

Like Tonkawa, Pottawatomie County's fields were discovered in regions where unfavorable geological indications had been thought to exist. It might be mentioned in passing, that at one time, a major company operating in Oklahoma, owned several thousand acres of leases scattered through Kay County, covering the best part of what later proved to be the Tonkawa Pool. The leases were about to expire, and in order to obtain a better idea of their prospective values, the company's geological department was charged with making an additional reconnaisance. Its report was so thoroughly unfavorable that the company decided to release all the existing leases rather than pay $1 an acre for renewals. The Tonkawa Field was discovered some years later, and this company now has a different chief geologist.

### Geologist Has Hard Time

In making surveys on lands like Tonkawa was at the time mentioned above, and like Pottawatomie County was six years ago, the geologists have innumerable difficulties. If they pass up a territory which later proves productive, in the parlance of the day, "It's just too bad," while should they make recommendations which later prove productive, it is probable that the officials will hold that the wells would have been drilled anyway.

The limited knowledge which was at hand six years ago has been greatly amplified in the intervening years, and Pottawatomie County today is the scene of the most active play in Oklahoma. The first big Wilcox sand production in the county was found when the Gypsy Oil Co.-Amerada Petroleum Corp.-Westland Oil Co.'s No. 1 State Land in Section 16-9-5 began flowing. This well opened the deep play in the Earlsboro Pool, and was always classified with the Greater Seminole area, although it was just across the line in Pottawatomie County. Since that time, the area around Maud, in Township 8-5, has been the scene of many interesting tests, and one of the largest potential wells (now shut in) is the Barnsdall Oil Co.'s No. 1 Fife in Section 14-8-5, just across the line in Seminole County. The reflex activity from this well will be carried into Pottawatomie County when the official ban upon the Maud region has been lifted.

Other pools which are extremely active although not making any startling amount of production at this time are the Pearson Switch and St. Louis Pools in Township 7-4. These pools are making their oil from the Hunton lime, and have several Wilcox sand failures within their borders.

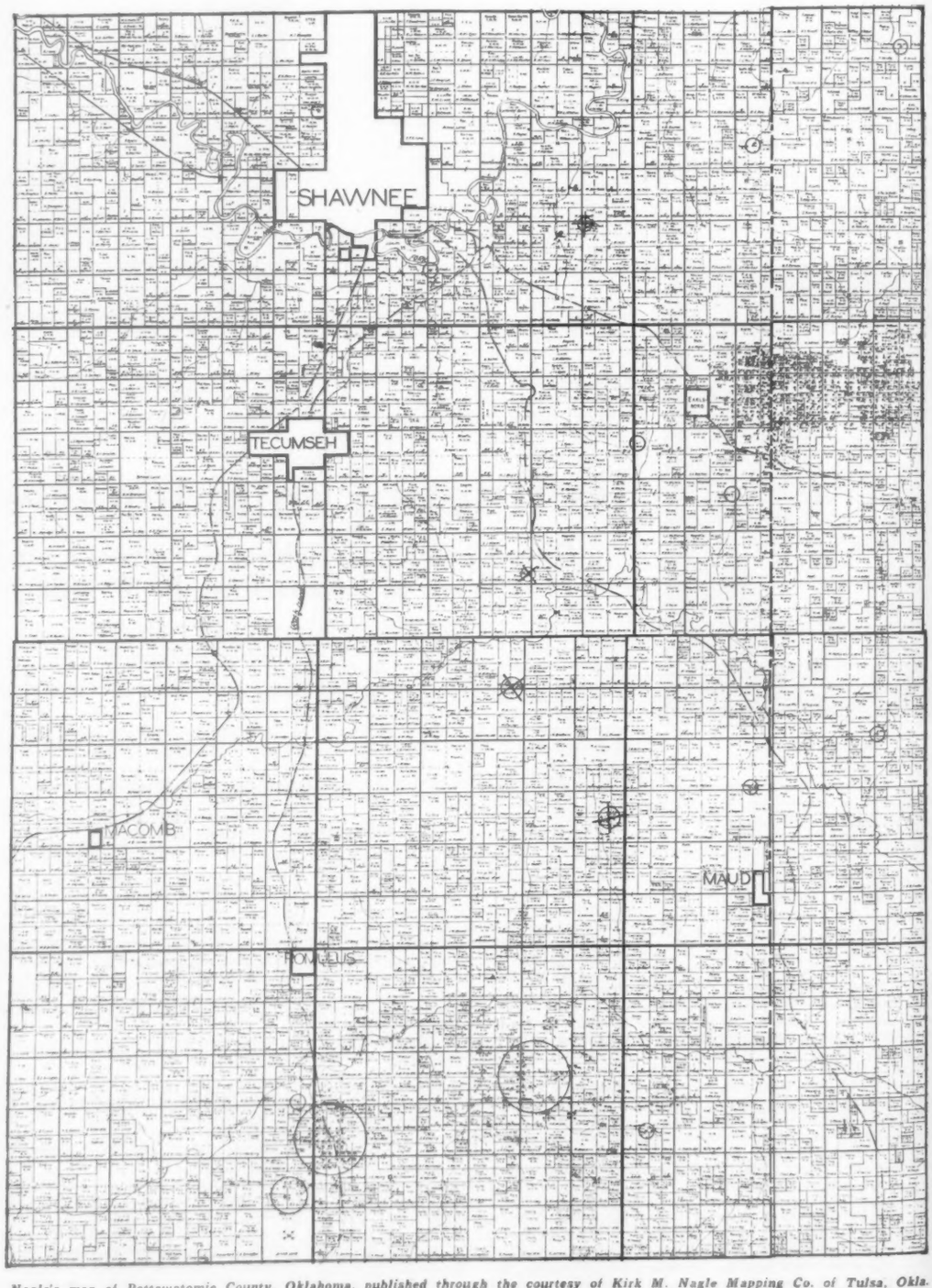
The most recent occurrence of interest in this area was occasioned by the finding of good production in the Indian Territory Illuminating Oil Co.'s No. 1 Sullivan in Section 25-7-3. This well has been flowing from a formation thought to be the Viola lime, and it has started new activities.

Pottawatomie County is composed chiefly of a gently rolling series of red bed hills located immediately west of the Seminole uplift in central Oklahoma. The Permian red beds were the cause of an unlimited amount of trouble in the days when all wildcat wells in this region were drilled with cable tools, as their soft nature caused caves which resulted in the premature plugging and abandoning of many wells. It was not until the introduction of the rotary tools into central Oklahoma that any progress in deep drilling was made in this region, although the drill had been active in many parts of the country since 1902.

### Future Play in That Area

The play of the future in this county will most likely be made within the bor-

(Continued on Page 219)




*Nagle's map of Pottawatomie County, Oklahoma, published through the courtesy of Kirk M. Nagle Mapping Co. of Tulsa, Okla. The Wilcox sand dry holes are shown by crosses placed through ci .les. Wildcat drilling operations are shown by a circle. The three larger circles at the bottom of the map show from left to right, th : new Indian Territory Viola Lime Pool, the Pearson Switch Pool and the St. Louis Pool.*

# New Price Schedule's Varying Effect

## Estimated Ups and Downs in Value of Crude Production in Mid-Continent Field. Net Increases in Oklahoma and North Central Texas

By James McIntyre

The average gravity of the crude oil produced in Oklahoma is 37.9 degrees. In November it was 38.4 degrees. The average gravity of Kansas oil is about 36.6 degrees, which is little different than the average in November. The decline in the average in Oklahoma was caused by the falling off in production of the high-gravity Seminole Fields and of other high-grade pools like Tonkawa, Garber, Braman, Davenport, Cromwell and Wewoka, where the oil runs from 39 to 47 degrees in gravity.

The remaking of the crude price schedule inaugurated by the Carter Oil Co. on February 21 and adopted by the other buying companies increased the average price of crude in Oklahoma about 1.66 cents per barrel. In Kansas where the gravity of the crude remains at 36.6 the increase in price amounted to about one-fourth of a cent per barrel.

The result in Louisiana and Arkansas was a net reduction of 2.9 cents per barrel in oil affected by the price changes. The North Central and East Texas crudes benefited about 2 cents per barrel. The sour crudes in the Panhandle were shaded down in prices but Gray County oil which is a better grade than that produced in Hutchinson and other Panhandle counties was benefited as a whole. The Standard Oil Co. of New Jersey, which inaugurated the price change through the Carter Oil Co., and made it more general through the Humble Oil & Refining Co., and the Standard Oil Co. of Louisiana, may be said to have broken even on the whole readjustment; that is, on the bulk of its Mid-Continent oil purchases, it is paying practically no more or no less than it was before.

All crudes above 36.9 degrees were increased at the rate of 1 cent per degree of gravity. The crude below 36 suffered cuts that varied from 1 cent per degree to more than 4 cents per degree.

A premium was put on the production of the higher grades of crude while the oils below 36 were penalized, some to such an extent that whatever small profit a producer could show under the old schedule was entirely wiped out and in some cases converted into a direct loss.

### Carter's Average an Increase

In the case of the Carter Oil Co., which first posted the schedule, the new posting meant an advance in the average price, even though it was small, for the reason that the company does not buy much oil in pools where the crude runs below 36 degrees. Its pipe line connection, the Oklahoma Pipe Line Co., draws most of its crude from pools producing high gravity oil. It does not enter the eastern Kansas fields or the old Bartlesville sand pools in Washington, Nowata, Rogers, eastern Osage or northern Tulsa Counties where the oil grades from 31 to 33 degrees. It picks up some crudes in Butler County, Kansas, and Creek, Okmulgee and Carter Counties, Oklahoma, that will run below 36, but it is safe to say that its average crude shipments to Standard of New Jersey refineries will run above 36.9 degrees in gravity.

It would be difficult to give the exact average gravity of the crude the Carter Oil Co. ships because it "batches" so much of its crude deliveries. The company may ship a batch of Burbank crude through the Oklahoma pipe line, followed by a batch of Seminole crude and then by a shipment of mixed oil.

In adopting the Carter Oil Co.'s schedule the other purchasing companies were placed in attitudes at variance with one another. With some the schedule meant nothing so far as oils below 36 gravity were concerned. The Marland Oil Co., for example, buys most of its Oklahoma oil supply from high-gravity pools. Other refiners who buy their supplies from high-grade pools alone had naught to do but to meet the new increases while not sharing in the benefits, to them, of the decreases.

With the older purchasing companies the oil bought under the new schedule will cost little, if any, more than the oil they bought under the old, on an average, because their pipe line connections serve so many old pools where the gravity of the oil is relatively low. The old price schedule so far as it applied to the old pools was just high enough to permit oil producers to make a small profit on their production by the exercise of rigid economy. The Oil and Gas Journal has told in a previous number how one oil company with over 1,800 oil wells was able to show a profit of 2 cents per barrel on its average production and that this represented only about three-quarters of a cent per day per well because the wells were averaging only .37 bbl. per day per well in production. That company, and many others like it, including individual producers, have had their very small profit taken away and under the new schedule will lose money on every barrel they produce, unless they can exercise even greater economies than those to which they were driven by the price reductions of 1926 and 1927.

### Changes Tabulated

With more time at our disposal than on the day the price changes were made, it is possible to give tables showing approximate results of the price advances and the reductions resulting from the new schedule. A total of 491,890 bbls. of Oklahoma oil above 36.9 gravity was increased in value $18,604.44 while 158,940 bbls. was decreased in value $7,797.14. The net increase in value of 650,830 bbls. was $10,807.30. This left 14,563 bbls. of 36 gravity oil produced in widely different fields unaffected by the market change.

Oklahoma oil companies with a large production in the high-grade fields of the Seminole area and in the Kay, Garfield and Noble County Fields, Burbank and Cushing-Shamrock were beneficiaries from the new price schedule. This includes the Sinclair Oil & Gas Co., L. H. Wentz, the Marland Oil Co., Comar Oil Co., Independent Oil & Gas Co., Indian Territory Illuminating Oil Co., Carter Oil Co., T. B. Slick and some others.

In Kansas 66,100 bbls. of daily production above 36.9 gravity was increased in value $2,584, or an average of 3.9 cents per barrel, while 39,704 bbls. of production was given a decrease in value of $2,348.36, or an average of 5.9 cents per barrel. The net result of the change in Kansas was to leave the average posted price practically unchanged.

In Louisiana and Arkansas only a part of the fields were affected, these being Caddo, Homer, Haynesville, DeSoto-Red River, and El Dorado. Caddo light oil, 39 gravity was benefited $347.10 per day, based on current production; Caddo heavy, 24 gravity was cut 16 cents per bbl. and the production lowered $631.20 per day in value. Homer and Haynesville, 34 gravity, received cuts of 2 cents per bbl. and El Dorado, 34 gravity was cut 2 cents. DeSoto, 40 gravity, was given a 4-cent increase, which raised the value of its daily production by $171.80.

A few of the North-Central Texas Fields were unfavorably affected. Breckenridge, Shackelford County, Coleman County and Brown County have considerable production below 36 gravity, but in the main the territory was given an increase in price. Oil of 42 gravity predominates in Wortham and Currie; 40 gravity in Richland, Palo Pinto County and Pioneer Pool, 38 and 39 gravity in Burkburnett, Archer County, Electra, Iowa Park, Corsicana light, Petrolia, Wilbarger County, Caddo, Clear Fork, Gunsight, Ranger-Eastland, Callahan County, Jack County and Desdemona. Powell and Mexia produce oil from 36 to 37.9, some of which gets a 1-cent increase. Nigger Creek produces better than 36.9 gravity crude.

**OKLAHOMA FIELDS**
**Price Increases on Oils Above 36.9 Gravity**
**Gravity Schedule Adopted February 21, 1928**

| | Gravity of Oil | Prodn. Feb. 20 Bbls. | Increase in Value |
|---|---|---|---|
| Billings | 43 | 188 | $ 13.16 |
| Blackwell | 39 | 1,200 | 36.00 |
| North Braman | 42 | 3,145 | 188.70 |
| South Braman | 43 | 1,789 | 125.23 |
| Bristow-Slick | 38-41.9 | 6,755 | 288.35 |
| Burbank | 37-39.9 | 42,600 | 873 75 |
| Garber | 42-47.9 | 9,880 | 868.30 |
| Hubbard | 38 | 2,973 | 59.26 |
| Thomas | 42 | 1,499 | 89.94 |
| Jennings | 39 | 999 | 29.97 |
| Knox | 37-40 | 6,960 | 86.40 |
| Deep Rock | 40 | 1,218 | 48.71 |
| Yale-Ingalls | 39 | 4,500 | 135.00 |
| Mervine | 38 | 290 | 5.80 |
| Papoose | 40 | 2,700 | 108.00 |
| Seminole | 40 | 308,706 | 12,348.24 |
| Jarvis-Holm | 38 | 849 | 16.98 |
| Cromwell | 38 | 10,498 | 209.96 |
| Wewoka | 39-40.9 | 8,500 | 294.00 |
| Seminole, miscellaneous | 38 | 2,200 | 44 00 |
| Pearson | 37 | 10,667 | 106.67 |
| Cushing | 37-40.9 | 17,330 | 475 70 |
| Okmulgee and Okfuskee Counties | 37-40.9 | 3,800 | 124.00 |
| Davenport | 41 | 2,347 | 117.35 |
| Osage Pools | 37-40.9 | 14,219 | 282.09 |
| Kay, Grant and Noble County Pools | 40-42.9 | 4,480 | 224.00 |
| Otoe | 42 | 924 | 55.44 |
| Tonkawa | 42-43.9 | 15,902 | 1,064.14 |
| Stroud-Kendrick | 41 | 1,552 | 77.60 |
| Cleveland | 39-40.9 | 1,500 | 54 00 |
| Jefferson County | 37 | 670 | 6.70 |
| Scattering | 37-51.9 | 1,050 | 145.00 |
| Total | | 491,890 | $18,604.44 |

Average increase 3.78 cents per bbl.

**Price Reductions on Oils Below 36 Gravity**

| | Gravity of Oil | Prodn. Feb. 20 Bbls. | Reduction in Value |
|---|---|---|---|
| Bristow-Slick | 30-35.9 | 17,590 | $ 1,105.90 |
| Brock | 34-35.9 | 835 | 11.25 |
| Cement | 34-35.9 | 1,705 | 26.05 |
| Cleveland | 32-34 | 576 | 14.52 |
| Fox | 28-32.9 | 3,105 | 315 00 |
| Graham | 32-34.9 | 4,800 | 127 00 |
| Healdton | 28-33.9 | 14,315 | 1,242.72 |
| Hewitt | 32-35.9 | 8,880 | 255.20 |
| Madill | 27 | 160 | 33.60 |
| Nowata-Chelsea | 32 | 6,900 | 276.00 |
| Bartlesville | 32 | 5,730 | 229.20 |
| Tulsa County | 32-35.9 | 8,200 | 161.00 |
| Osage County | 33-35.9 | 16,780 | 278.40 |
| Sholem Alechem | 29 | 12,500 | 1,625.00 |
| Jefferson County | 34 | 650 | 13.00 |
| Cushing-Shamrock | 34 | 830 | 16.60 |
| Duncan | 29-35.9 | 2,100 | 129 60 |
| Walters | 27-32.9 | 999 | 171 14 |
| Robberson | 24 | 2,200 | 792.00 |
| Glenn Pool-Sapulpa | 32 | 7,000 | 280.00 |
| Okmulgee | 35 | 16,400 | 164.00 |
| Loco-Milroy | 27-30.9 | 2,100 | 323.81 |
| Jennings | 35 | 425 | 4.25 |
| Stephens County | 30-34.9 | 1,015 | 30.45 |
| Scattering | 35 | 23,145 | 231.45 |
| Total | | 158,940 | $ 7,797.14 |

Average reduction 4.9 cents per bbl.

Net increase in price of Oklahoma crude oil, 1.66 cents per bbl.

**KANSAS FIELDS**
**Price Increases on Oils Above 36.9 Gravity**

| | Av. Gravity | Prodn. Feb. 20 Bbls. | Increase in Value |
|---|---|---|---|
| Greenwood County | 41 | 30,250 | $1,622.50 |
| Fox Bush | 39 | 1,150 | 34 50 |
| Rainbow Bend | 41 | 1,900 | 95.00 |
| Other Cowley County Pools | 39 | 5,000 | 150.00 |
| Churchill | 39 | 12,600 | 378.00 |
| Oxford | 38 | 15,200 | 304.00 |
| Total | | 66,100 | $2,584.00 |

Average increase 3.91 cents per bbl.

**Price Decreases on Oils Below 36 Gravity**

| | Av. Gravity | Prodn. Feb. 20 Bbls. | Decrease in Value |
|---|---|---|---|
| Augusta | 32 | 3,050 | $ 376.50 |
| El Dorado-Towanda | 34 | 14,250 | 285.00 |
| Peabody-Elbing | 34 | 3,850 | 77.00 |
| Covert-Florence | 33 | 1,450 | 43 50 |
| Eastern Pools | 28 | 8,777 | 1,316.55 |
| Scattered Pools | 33 | 8,327 | 249.81 |
| Total | | 39,704 | 2,348.36 |

Average decrease 5.9 cents per bbl.

# All Helium is Made in Mid-Continent

## Kansas Boasts Only Commercial Plant. Process the Reverse From Refining. Radio Tubes May Stimulate the Industry

By J. L. Dwyer

DEXTER, Kans., Feb. 25.—The only plant in the world devoted to the commercial production of helium is owned by the Helium Company, and is located at this town in Cowley County, Kansas, in the southeastern part of the state. There is one other plant which makes helium, located at Fort Worth, Tex., and owned by the Federal Government, and operated by the helium division of the United States Bureau of Mines. The combined output of these two plants constitutes the total production of this valuable gas upon which the future expansion of airship construction and progress so greatly depends. The two plants are strictly competitive because, under a ruling of Congress, the government plant may operate and produce helium only when it can do so at a figure which compares favorably with the cost of the product of commercial plants. The federal plant is supported by Congressional appropriation.

The Helium Company (which is a subsidiary of the Kentucky Oxygen & Hydrogen Co. of Louisville, Ky.) was attracted by the possibilities of extracting helium from natural gas one year ago. Plans and contracts for a supply of suitable natural gas were made, and ground for the plant was broken on May 1, 1927. The plant was in operation, and the first cylinder of helium was shipped on September 1, 1927, and since that time, the plant has been in active operation.

According to the statement of R. R. Bottoms, general manager of the company, the natural gas which is produced in this part of Kansas abounds in traces of helium, but the majority of gases do not contain sufficient quantities to warrant processing. The history of helium discovery in Kansas is interesting, and might be related.

In 1906, a wildcat well drilled on the edge of the town of Dexter found natural gas at a depth of 500 feet. This well apparently meant a great deal to the community, and created much interest in a spot which had been confined to agriculture. There was unlimited publicity attendant upon this gas well, and the town fathers decided to make a gala day out of the occasion. A band was hired, speakers were obtained, and a holiday proclaimed.

### Everything Went Well, Except

The program was to have been an introductory speech by the mayor who would then touch a torch to the well, and allow the gas to shoot many feet into the air. After this spectacular performance, the various speakers were to have been introduced, and their chief mission was to dwell upon the boon which the gas would prove to the growth of the town. Industries were assumed to be anxious to locate at Dexter on account of the cheap fuel which would be provided, and all was rosy.

The first part of the program was perfect. Lines were laid from the well to the speakers' stand, and the mayor made his introductory remarks, and then the gas was turned on, and the torch held by the mayor was lighted and applied to the end of the pipe. To the amazement of all, the torch was blown out by the gas. It was concluded that the pressure of the gas was too great, and accordingly, the output was pinched in, and a second torch applied. It suffered a fate similar to the first. The town dads were good and mad by this time, and a decidedly damp blanket was thrown over the celebration, but in an effort to snatch victory from defeat, a huge bonfire was built near the end of the pipe, and when it was going good, the gas was turned into the bonfire. The bonfire went out like the torches.

The celebration was completely blown up, and the town authorities sent for Dr. H. P. Cady, a professor of Kansas University. After examining the gas, Doctor Cady found that it contained a good percentage of helium. The helium was never put to use until the Dexter plant was started.

*R. R. Bottoms, general manager of The Helium Co., who was formerly an officer in the United States navy, attached to the helium division.*

### Opposite of Refinery

There are innumerable features about a helium plant, and probably the most terse manner of describing it is to state that it is exactly the opposite of an oil refinery. The refinery takes liquids and after vaporizing them, separates the vapors, various products being derived from these vapors. A helium plant does exactly opposite. It takes natural gas and liquefies the various elements found in it. After liquefaction takes place, the helium which is the least liquefiable of the elements in the natural gas, is left in gas form, and is placed in cylinders similar to oxygen cylinders.

In oil refining, the temperatures of the liquids are raised, in order to vaporize the contents, the lighter hydrocarbons being driven off first. In helium extraction, the temperatures of the gases are decreased until the liquefaction temperatures are reached, and since helium has a much lower liquefaction temperature than any of the other elements in natural gas, it remains after the methane, butane, nitrogen and hydrogen are removed. The liquefaction temperature of nitrogen is 195 degrees below zero Centigrade. That of hydrogen is 254 degrees below zero Centigrade, and that of helium is 268 degrees below zero Centigrade. The zero used is the absolute zero. By converting this scale into Fahrenheit, it is found that helium has a liquefaction temperature of 462 degrees below zero.

### Better Gas Found Deep

Practical operation in helium production has necessarily taught many lessons, and exploded some theories which had previously been held. The most important is that the deeper the sand which contained the gas, the poorer helium contents would be found. The first helium gas in this area of Kansas was found at a depth of 500 feet, and the gas contained 1.7 per cent helium. The next sand to be used was found at a depth of 1,050 feet, and this gas contained 1.8 per cent helium. A sand at a depth of 1,100 feet contained 2 per cent helium, and the recent well of the Blaudell Oil Co. near Moline in Elk County, found gas with a helium content of 3.4 per cent at a depth of 2,000 feet. This well, it is said, contains the highest percentage of helium in any gas which has been found. It is not believed that the area in general will develop wells having a content which shows this yield, as many other wells around the Blaudell well have been tested and their helium content found to be less than 1 per cent.

The work of extracting helium from natural gas is unusually interesting. A novel sidelight is that gasoline which occurs in the gas, constitutes a very objectionable feature. The extremely low temperatures used cause the gasoline to freeze and impede the process. The gasoline piles up like ice cream, and after the officials of the plant had tried to eliminate this difficulty, a Southwestern Engineering Co. portable gasoline plant was built, and is used to remove the gasoline from the gas.

At present the plant is taking natural gas from two different fields; one a mile from Dexter, and the other 5 miles. At this time a third gas field is being connected to the plant and it is also 5 miles distant. The gas is taken from the wells and by ordinary gas booster stations is sent through 4-inch lines to the plant. A pressure of 50 pounds is used for transmission. The gas is received and sent through scrubbers which remove all traces of carbon dioxide. The carbon dioxide is another unfavorable compound which must be taken out, as it has a

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# New Seminole Plan Gaining Favor

## Conservative Development With Probable Elimination of Many Dry Holes Has Approval of Large Majority

A plan believed to incorporate the most desirable method of drilling up the territory south of the Little River Pool, of the Greater Seminole area of Oklahoma, seems to have the approval of the majority of operators in this area. At a meeting held in Tulsa on Monday of this week, the plan was presented by Ray M. Collins, umpire, and the operators and companies present voted for its adoption. There were some interests not represented, and since the adoption of this policy would necessarily have to be unanimous, the umpire and the committee are now visiting these interests in order to obtain their signatures.

The plan calls for the drilling of nine test wells located between the present limits of the Little River Pool, and the Independent Oil & Gas Co.-Highway Oil & Refining Co.'s well in Section 23-7-6. There are two good wells in this region, the Independent-Highway well, and the well of Snowden & McSweeney in Section 13-7-6. Under ordinary methods of drilling, the region between these wells would immediately be covered with derricks, and the territory to the south and to the west of the Independent-Highway would also be tested for a short distance. It is estimated that if the lid had been raised unqualifiedly in this area, and drilling activity such as prevailed at Seminole City were the order of progress, at least 125 bbls. would be started on March 1. Under the new plan, the test wells will be located approximately one-half mile apart. Their locations provide for acquiring a much better idea of the structural conditions of this important section of the Mid-Continent Field, and upon their completion much of the subsurface data will be available. The consensus of opinion regarding the possibilities of this region seems to indicate that the drilling of the test wells will cause many headaches, and that some parts of this territory will be decidedly spotty. The headaches will be only a fraction of the number which would have been caused if the region had been thrown wide open. By adopting this action, it is probable that 40 or possibly 50 dry holes will be avoided, and this means a saving of $3,000,000 to the industry at large.

### Discovery Rights

Under the provisions of the plan, the three locations which offset the Independent-Highway well, and the three which offset the Snowden-McSweeney well, may be drilled starting March 1. The other nine wells marked with a triple circle on the accompanying map may be started on March 1. In order to protect discovery rights, both the producing wells mentioned above may be thrown wide open on March 1, and remain so until the offset wells reach the top of the Wilcox sand, after which the wells and the offsets are to be pinched in to 50 bbls. daily.

Seventy-five days after March 1 the wells marked with a single circle on the map may be started, and when the first of this group of wells reaches the Wilcox sand all wells in the region may be thrown wide open and produced at capacity. Until that time the output of all the wells must be pinched in to 50 bbls. daily, excepting for the period of discovery rights mentioned above.

Summarized, this agreement means that it will be at least 150 days after March 1 before any large quantity of new production may be expected from this region. This alone should be sufficient to commend the operations of the plan to all concerned. The cost of drilling the test wells will be shared by the owners of the three offset locations, and probably the dry-hole contributions will be assessed at $10,000 per location, making a total dry-hole contribution of $30,000 which will be paid to the owner of each test well should it be a failure. If the test is a producer, naturally, the dry-hole contributions will be saved, and the owners of the offset locations will be allowed to start their wells.

The agreement presented for consideration follows:

"The undersigned, being all of the lessees holding oil and gas leases, or having the right to drill wells for oil or gas on the area in Seminole County, Oklahoma, indicated on the plat attached

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# French Chamber Passes New Oil Law

## Aimed to Stimulate Refining in France in Hope of Getting Supply of Crude From Mosul and Russia in a Few Years

Specially Contributed

During the year 1927, petroleum assumed a predominant place in French politics, having been the object of important new parliamentary measures for the establishment of a government control of petroleum imports and a new schedule of customs tariffs favorable to the revival of the refining industry in France.

The government's bill to stimulate oil refining in France for the time when, it is hoped, sufficient supplies will be imported from the Mosul and Russian fields to make France practically independent of American and English companies, has just been passed by the Chamber of Deputies.

The bill fixes the import duties on all kinds of oil, but gives a benefit of 8½ francs per hectolitre on oils to be refined in France. All crude oil must be refined in factories controlled according to terms laid down by this act. There is, it is said, no question of the government or exclusively French companies owning or directing these refineries. All that is stipulated is that government control be established in the factories.

Crude oil will be exempt at entry from all tax unless special storage and origin taxes are applied. At issue, it will be subject to license duties which will give it a slight advantage over directly imported refined oil.

Under the new act, a ton of lubricating oil will pay 700 francs import duty. If refined within the country, it will pay 400 francs. The general tax on refined oil was fixed at 24 francs a hectolitre, with an 8-franc minimum tariff. Raw oil will pay 37 francs, half the general tariff, with a 12.50-franc minimum.

### Americans to Protest

Protests of American oil companies against the bill passed by the French chamber will be submitted through their French subsidiaries or representatives. The Standard Oil Company of New Jersey has the largest interests in France of any American company. Its French subsidiary is L'Economique Societe Anonyme de Distribution de Petrole et Essence. The Standard of New Jersey owns about 31,000,000 of the 70,000,000 francs share capital outstanding. The subsidiary markets all kinds of petroleum products in France. Another subsidiary, the Bedford Petroleum Company, markets lubricating oils and wax in France as well as in other European countries. The oils used in the Standard of New Jersey's products distributed in France are obtained from various sources, including American.

The Texas Corporation does an extensive marketing business in France through its subsidiary, The Texas Company, S.A.F. The Sinclair Consolidated Oil Corporation distributes its products in France through an affiliated company, Compagnie Industrielle des Petroles, and operates a large lubricating oil installation at Rouen, through a subsidiary, Compagnie des Huiles Sinco. From this station it distributes lubricants at wholesale in France and in French colonies.

The amendment to which the American oil interests object mainly is designed to limit the amount of oil which foreign companies may import into France to the average amount imported during the past five years. The American companies have been operating in France on a large scale for only about three years and their business continues to increase. They have made large investments in France on the theory that they would be permitted to expand their business without interference.

### Imports Checked

Although petroleum statistics have not yet been published for the past year, it would appear that the steady increase registered during the past 10 years in French oil imports has finally been checked and that imports for 1927 may possibly show a decrease compared to those of 1926, due to the period of crises which certain branches of French industries have experienced during the past 12 months and in spite of the increasing popularity of the automobile in France.

Statistics for the first eight months of 1927 show that 1,219,952 metric tons of petroleum products were imported into France, compared to 1,280,677 metric tons during the same period of 1926. This decrease in imports is noted in practically all categories of petroleum products, with the exception of fuel oil whose use in the merchant marine becomes more extended each year. The United States contributed some 60 per cent of these imports, compared to 66 per cent in 1926, whereas increases are shown in imports from Russia, Rumania, and especially from Persia and Asiatic countries.

### Terms of Law

By the terms of the law of January 10, 1925, petroleum importers in France are obliged to carry oil stocks amounting to one-fourth of the quantities declared by them for consumption during the previous 12 months. On June 1, 1927, the following estimate was given of the reserve stocks on hand as at that date: Gasoline, 352,827 tons; kerosene, 131,348 tons; fuel oil, 69,512 tons; gas oil, 33,444 tons, and lubricating oils, 139,558 tons.

A serious effort has been made during the past few years to increase the capacity of petroleum reservoirs, which capacity was represented by 650,000 cubic meters during the war, by 1,832,489 cubic meters in August, 1923, and by some 2,198,656 cubic meters (77,636,259 cubic feet) in August, 1927, of which 1,878,803 cubic meters (63,684,090 cubic feet) are to be found in France itself and the remainder in the French colonies. About 57.8 per cent of these reservoirs are located near French petroleum ports of which the principal are Rouen, Havre, Marseille, Bordeaux and Dunkerque, and 42.8 per cent in the interior of France.

The total capital investment in the petroleum industry in France has been estimated at 1,973,460,000 francs, bringing a total profit to petroleum importers of some 160,000,000 francs and a net asset to the French government of some 1,126,765,000 francs, which does not include the profits tax of private companies and the dividend tax of shareholders.

### Great Britain

The indicated total British internal consumption during 1927 of liquid petroleum products, including crude petroleum and the various products imported as such, was approximately 1,640,000,000 imperial gallons (nearly 2,000,000,000 United States gallons) and showed an increase of some 136,000,000 gallons, or 9 per cent, over 1926, according to the best estimates at present available. This establishes a new high record for petroleum consumption in the United Kingdom, and one of the principal features of the trade was the larger proportion of the home requirements which was supplied by domestic refineries. The total imports of mineral oils, other than crude, amounted to 1,386,500,000 imperial gallons, which was only about 10,800,000 gallons, or less than 1 per cent, in excess of the corresponding imports in 1926. Imports of crude oil, on the other hand, at 664,800,000 gallons showed an increase of 127,400,000 gallons, or 24 per cent, over 1926, and as domestic exports of refined oils registered a further small decline, the whole of this large increase in crude oil receipts found its way, after refining, into local consumption. Further, re-exports of imported refined oils in 1927 exceeded the figure of the preceding year by about 6,500,000 gallons, which, added to the decrease in domestic exports, almost exactly balances the increase in the imports of these products, so that, in effect, the growth in consumption was practically entirely met by increased imports of crude petroleum refined locally.

Thus, although the 1927 imports of mineral oils, other than crude, actually reached a new high level, nevertheless the trend toward supplying an increasing share of consumption by domestic refining of crude oil, which began some years ago but which was temporarily interrupted by the abnormal industrial conditions obtaining in 1926, appears to have been resumed.

### Bunker Oil

In addition to the internal consumption of petroleum products, as noted above, about 253,000,000 gallons of bunker fuel oil were supplied at British ports to vessels engaged in the foreign trade, this figure being almost identical with the corresponding shipments in 1926.

Among other features of general interest in the British petroleum trade during 1927 were the further substantial growth in gasoline consumption accompanied by a decline in prices to, and in some cases below, prewar levels; increased imports of American oil products; the controversy over the sale of Russian oil products, both in the United Kingdom itself, which apparently resulted in a decline in imports from Russia, and also in connection with sales in other countries in which British petroleum companies are interested; a generally lower level of prices over the whole range of major products; and continued depression in the Scottish shale oil industry. In connection with the latter feature, the quantity of shale oil refined in 1925 amounted to 50,210,000 imperial gallons, according to figures published by the Board of Trade, while in 1926, only 39,860,000 gallons were run to the refineries, and there was doubtless a further decline in the past year. This falling off in the only important domestic production of mineral oil may, in the near future, be offset, however, by the production of oil from coal. A considerable amount of research work, both governmental and private, is being done on coal hydrogenation and low temperature carbonization, and while the development of oil production from this source on a commercial scale is necessarily slow, the progress made in this direction during 1927 is understood to have been encouraging.

A recent statement in London of the Indo-Burma Petroleum Company is to the effect that it has just announced its inability to pay its usual interim dividend owing to the situation created by the imports of Russian oil by the Standard Oil Company of New York. It is also stated that the market value of the shares of the Burma Oil Company, which is the leading oil concern in India, has dropped from 96 to 58 rupees since the beginning of this competition from Russian oil marketed

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### REVIEW OF FOREIGN DEVELOPMENTS

*The French Chamber of Deputies has just passed the petroleum law which is designed to stimulate refining in France in expectation of getting a supply of crude from Mosul and Russia within three or four years. American investments are affected and protests are expected.*

*Rumanian production increased during 1927 but there are fears of a decline during the present year.*

*Poland will soon cease to be an oil exporting country, it is thought, owing to decreasing production.*

*British oil consumption was 9 per cent greater in 1927. While imports exclusive of crude were less than 1 per cent more than the previous year, imports of crude were 24 per cent larger. The increasing proportion of the growing consumption supplied by home refineries is a feature of the trend.*

*Russia produced in 1927 the largest quantity of oil in 25 years.*

# New Pools Being Found on Gulf Coast

## Discoveries in Scattered Wildcat Territory With Prospecting Over Wide Area May Open Additional Fields

By Nell Williams

HOUSTON, Tex., Feb. 27.—Oil discoveries in South Louisiana the past few months have stimulated interest of Gulf Coast operators in the possibilities for development of a number of new important pools in that territory. These discoveries in scattered wildcat districts, together with a score or more of additional prospective spots on the horizon would indicate that coastal Louisiana offers an extensive potential source of petroleum supply.

Finding of oil on the Sorrento Dome of Ascension Parish by the Gulf Refining Co. the latter part of January has extended coastal production far east from the present confines of commercial fields and has taken it for the first time onto the east side of the Mississippi River in coastal territory.

Since November, two good wells have brought to light a new field in Cameron Parish, southwestern Louisiana, in the Hackberry Island district, and only last week a 1,500-bbl. producer was brought in at Sweet Lake, another new field in Cameron Parish. The latter was not the discovery well, two others having been brought in previously during October of 1926, but the new well did prove that Sweet Lake is a source of crude not to be overlooked.

These three new districts alone have done much to bolster the confidence of operators that the Gulf Coast territory has many chances for comebacks and that extensive virgin fields may be waiting to be uncovered.

Operators are watching most closely the Sorrento Dome, which at present is the rankest of wildcat fields. On this dome, the Gulf Refining Co.'s first well, and the first successful completion east of the Mississippi River, came in flowing at the rate of 4,000 bbls. of pipe line oil daily.

Although the Sorrento Dome is controlled entirely by the Gulf Refining Co., which has a solid block of 45,000 acres with the well in the center, and as a result there will be no excessive drilling, the field offers an easy source of new crude as production so far tapped is at the shallow depth of around 1,660 feet.

### May Be Two Pools

The Hackberry Island district on the west side of Calcasieu Lake in Cameron Parish, southwestern Louisiana, is another probable extensive source of new crude in coastal Louisiana. This may turn out to be two separate fields as it is believed that two distinct salt domes, from 2 to 3 miles apart, lie there.

The East Hackberry Dome at present is the on'y one on which a field has been opened although more extensive drilling has been done on the old Hackberry Dome to the west. The east dome was located only in January, 1927, through seismograph operations conducted jointly by the Calcasieu Oil Co., Magnolia Petroleum Co. and the Union Sulphur Co.

Drilling was started several months later on the first test, which had a gas blowout resulting in the loss of the hole. The second test, unusual for salt dome fields, hit the oil and was brought in last November 5 flowing 1,000 bbls. daily of pipe-line oil. Production held up remarkably for a long time for now the well is making only about 200 bbls. of net oil with considerable water.

The further possibilities at East Hackberry were revealed only last January when the second producer came in flowing from 1,800 to 2,000 bbls. daily of practically pipe-line oil, a much larger well than the first and extending production 200 feet. As this is written another test is on the sand.

The older of the Hackberry domes was discovered about 1903 and in the past several years more than 60 tests have been drilled, some of which have had showings but none of which has made a commercial well. This does not condemn the dome as salt dome fields always are so limited in area that most times years and years of drilling are required before the productive spot is found.

Since the discovery of oil on the East Hackberry Dome, C. O. Noble and associates drilled a wildcat down on the southeast of the Old Hackberry district. This test tried to blow out and showed heavily of oil. There are some operators who believe that this test has opened production on the old dome although at this writing the well has not been tested or completed and it is not known what it will do.

Only two weeks ago a 1,500-bbl. well was brought in at Sweet Lake, also in Cameron Parish but east across Calcasieu Lake from the Hackberry Field. This was the third producer completed in that district but it was by far the largest and indicated that that wildcat pool has prolific possibilities.

### Sweet Lake Pool

The Sweet Lake Pool was discovered by the Pure Oil Co. in October of 1926 by a well which came in making 10,000,000 feet of gas with a spray of 200 bbls. of oil. This production increased to about 700 bbls. daily but since then the well has sanded up and has been worked over several times and at present is not flowing. Sweet Lake's second well also was brought in during October of 1926 but it has not flowed for several months. Development of Sweet Lake is slow as the production is from sands below 5,500 feet. The discovery well produced from sand at a total depth of 5,897 feet.

Also during the past year new fields were opened on the Starks and Sulphur Domes, both in Calcasieu Parish, Louisiana. Although neither of these so far has developed anything of particular importance, both are being drilled carefully. Three producers have been completed at Starks and two at Sulphur. A 600-bbl. well, the first drilled, also was brought in at Feussa Point, Iberia Parish, by the Gulf Refining Co. the latter part of 1926.

South Louisiana's oil possibilities lie not especially in these discoveries but in the score of other salt domes, not including present fields, known to exist and prospective dome on which little or no drilling has been done, and also in the extensive territory in which additional such formations may be uncovered as a result of geophysical operations under way.

The existence of these domes does not foretell new fields as past averages place the productive dome at only one in three, and, none of the undeveloped domes may bring to light new fields. They do, however, furnish favorable conditions for drilling and chances for finding oil.

Since 1922, major companies have been conducting extensive geophysical operations with the seismograph, torsion balance and other machines, in an effort to locate salt domes. This is being carried

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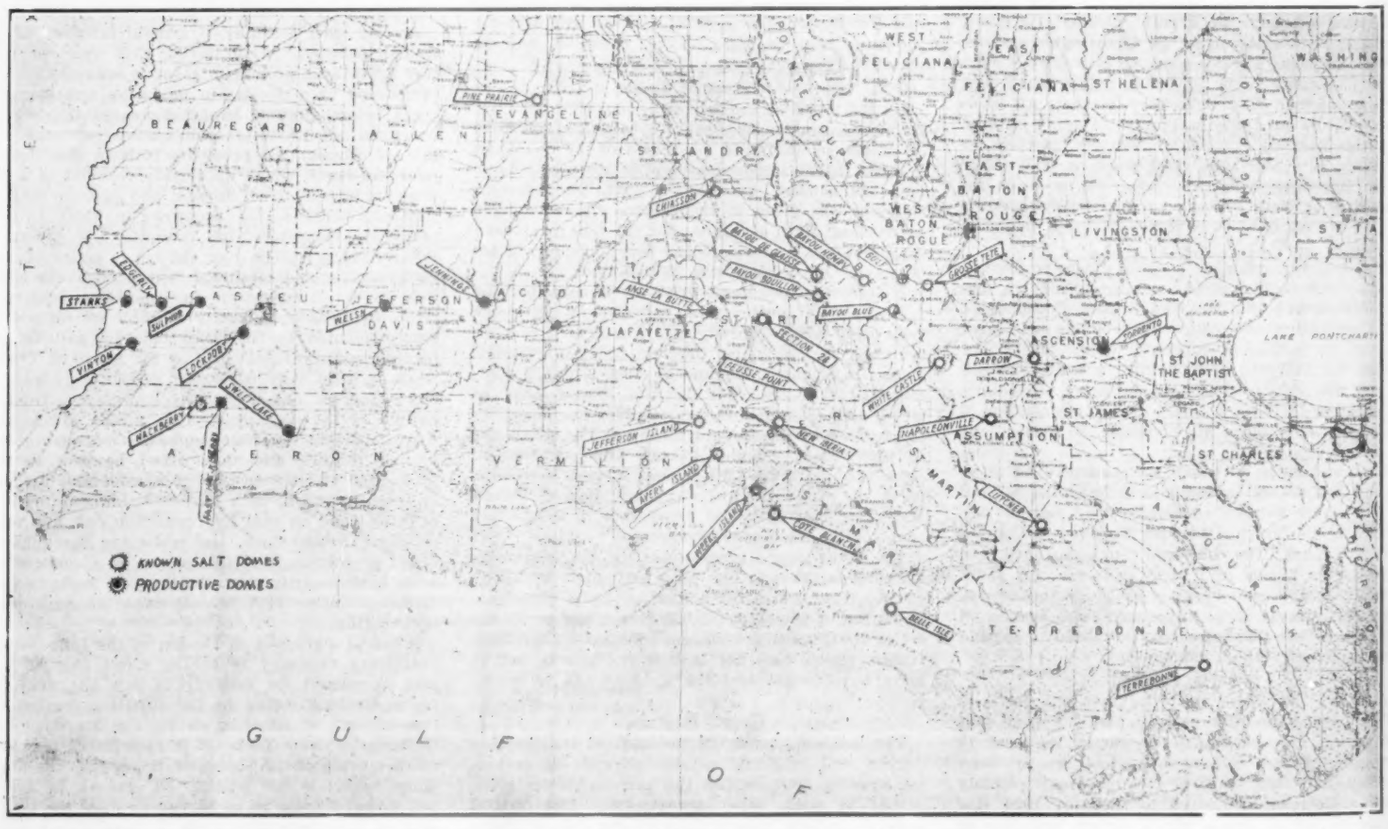


*Map showing all known salt domes in coastal Louisiana. Those on which there are proven fields or on which oil has been found also are indicated.*

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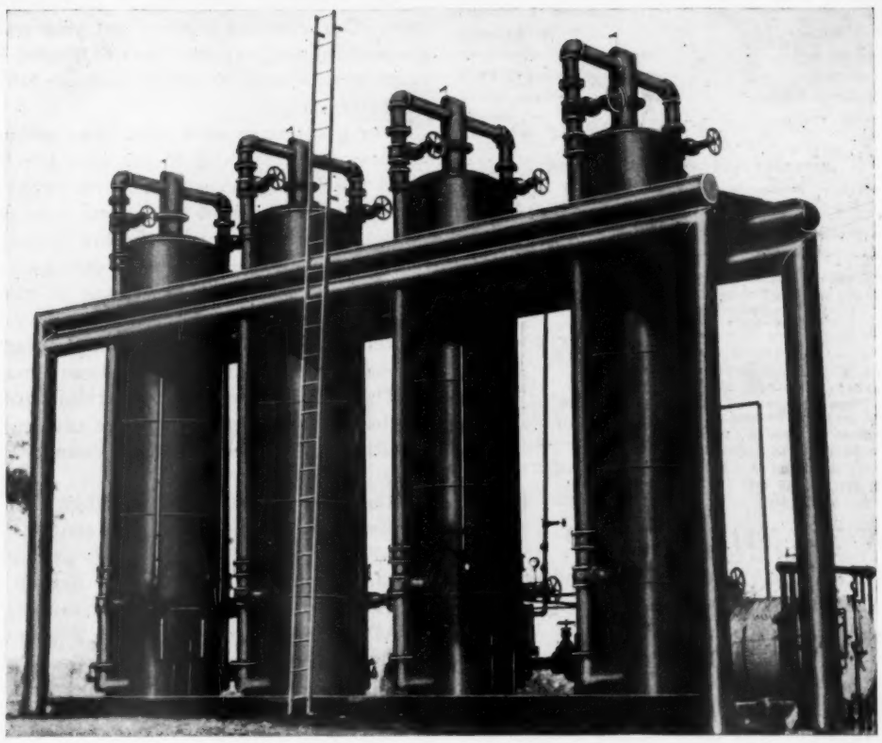

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## A WINDOW TO THE WORLD

The potential influence on the American oil industry of Venezuelan crude and of the remarkable growth of refining and marketing abroad is just beginning to be realized.

It took the industry a long time to understand that no one branch of it could prosper permanently at the expense of other branches and that in the long run the interests of producers and refiners were so bound up together that what helped or hurt one reacted sooner or later on the other.

It took even longer to realize that competitive overproduction is a mistake and that the path to prosperity is through stabilization.

It was necessary first of all to get men to look beyond their own immediate local or individual interests and to study the effects upon the industry at large, effects that in the end affected everyone in the business, no matter how self-centered he was upon his own affairs.

The industry has now come to look upon itself nationally, to consider the business as a country-wide operation, but it is growing so fast that already it is much more than that. The rapidity of petroleum developments abroad and their potential influence upon the industry in America calls for an even broader outlook by American oil men which will envisage the world-wide ebb and flow of oil in the fields and markets at home and across the seas.

Too many men in business study prices instead of conditions, concentrating on effects instead of causes.

This universal growth of the oil business, new production in Irak, in South America, in Russia, the building of new refineries in Europe, Latin America, Canada and Australia, the establishment of a petroleum monopoly in Spain designed to promote a Spanish refining industry and the movement for a similar purpose in France based on the hope of a crude supply from Irak, together with the expansion of the Russian industry which is keenly competing for the markets of Europe, is destined to become more and more a factor affecting our national industry.

The accessibility of Venezuelan crude and its great potential production are for the moment obscured by the possibilities of West Texas but cannot fail to have an influence on the American industry. Fortunately it is in strong hands and need not be feared as a market demoralizer. In fact, foreign production, being held in large blocks and as investments not subject to competitive drilling, is not likely to flood the market.

The developments in refining and marketing abroad are much more likely to be of pressing importance.

Our overproduction during the past year gave the rest of the world the cheapest petroleum products it has had for a long time.

Many Americans have been in the habit of belittling our exports as a mere drop in the bucket compared to our vast home markets, forgetting that in the case of gasoline, for example, export orders have frequently enabled the industry to maintain living prices in times of overproduction.

Our domestic consumption increases about 40,000,000 barrels a year. Our gasoline exports last year were 44,500,000 barrels. Our gas and fuel oil exports were 47,000,000 barrels. Our kerosene exports were almost 20,000,000 and our lubricating oil exports almost 10,000,000 barrels.

Our gasoline exports have been gaining steadily since 1921, the increase in 1926 being 40 per cent but in 1927 the total was only about the same. Kerosene exports have been fluctuating for several years but gas and fuel oil exports have climbed steadily since 1922.

Last year's exceptionally low prices for petroleum products failed to check the building of foreign refineries which are plainly counting on an expected growth in motorization abroad. Today there are more than 6,000,000 motor vehicles in use outside the United States and cheaper cars and cheaper fuel are increasing that number more rapidly than had been thought possible.

The development of commercial synthetic motor fuels is slow but in several countries they are running cars with some variety of it. Practically every civilized country is trying to assure itself a supply of automotive fuel.

Some that have oil production, like Colombia, are trying to nationalize oil, thus tightening control of it. Others, like France and Spain, without appreciable production, are seeking control of the refining of petroleum. British producing companies are increasing their refineries and extending their marketing systems.

All this, too, at a time when overproduction had depressed oil prices all over the world, showing very clearly that our trade rivals abroad are not "downhearted" over the future of the oil business.

The rebound will find them prepared to compete very actively for the rapid growth in demand for oil products they see coming.

Realizing this The Oil and Gas Journal has been publishing a monthly review of oil developments abroad as well as current news of foreign petroleum activities but it may be suggested that in addition to this information the time has come for the organization of a capable, mentally alert committee selected from qualified oil men in this country for the purpose of watching and studying foreign oil development, analyzing import and export figures, keeping pace with refinery construction and methods—in short, watching all foreign movements—and functioning as a watch tower for the interests of the American producer and refiner who is not big enough to look after his own interests abroad.

Delegations of competent men of the committee could be sent abroad on regular inspection tours. Our oil fields are eternally watched by foreigners, English, French, Russians, Germans and Japanese, etc., as they may be seen everywhere, while we are too busy playing our own business.

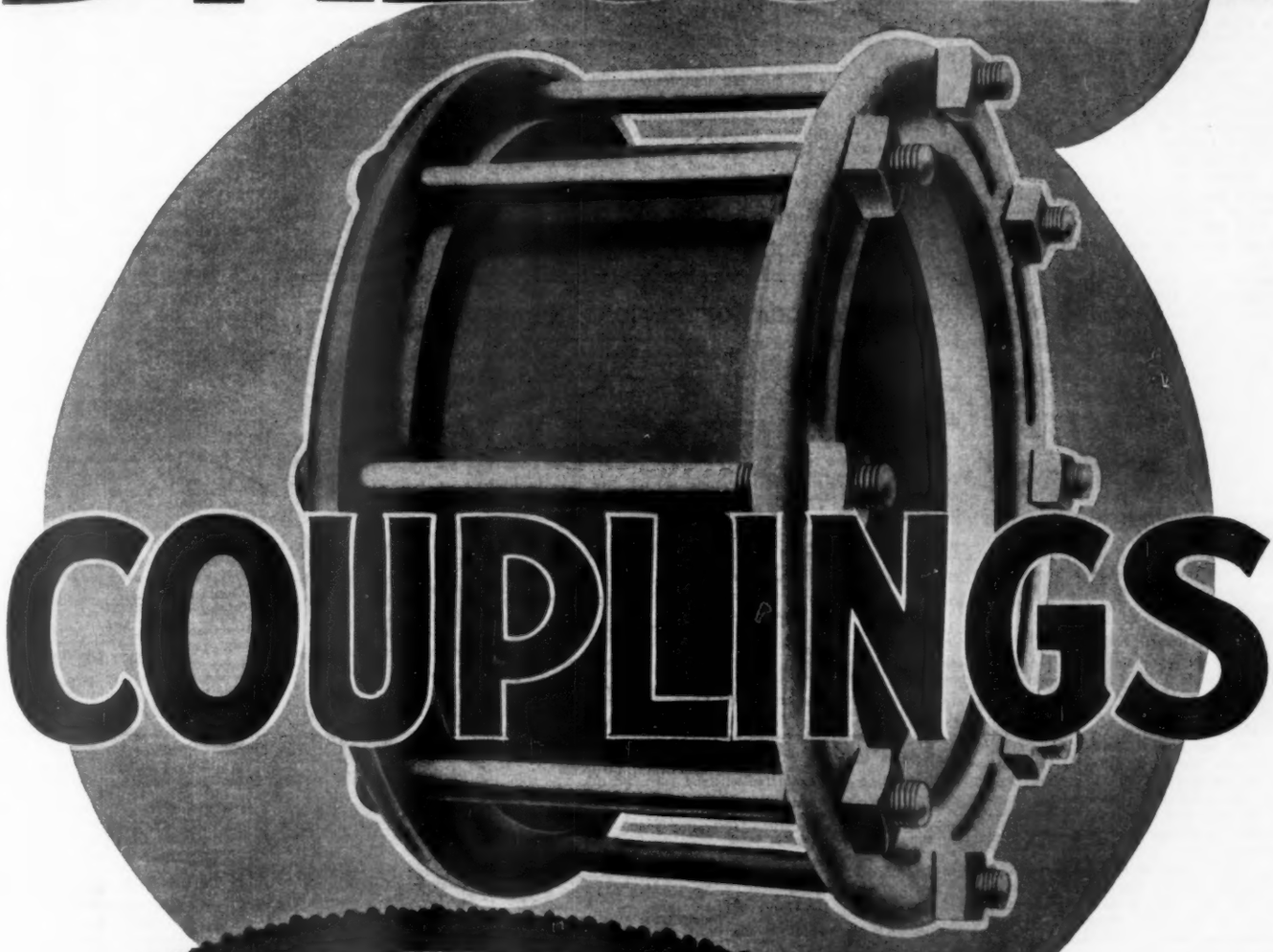
The industry should have one porthole at least through which to study what is rapidly becoming a considerably powerful competition.

The Bureau of Foreign and Domestic Commerce under the direction of Secretary Hoover, through its representatives abroad, is doing an excellent work in looking after American oil interests in the way of reporting movements and conditions but to get the fullest value out of this work the selection of such a committee of practical oil men as suggested to make a continuing study of foreign markets and opportunities is needed.

The information it could obtain, digest and analyze for the information of the American industry would be invaluable in the years just ahead when foreign competition becomes firmly established.

The American oil industry needs a window to the world and vigilant representatives constantly on the lookout.

# DRESSER



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# DOMINATE

# New Pool Opened in Ranger District

## Extension of Cook Ranch Pool 1½ Miles North. Panhandle Wildcat Causes Temporary Excitement

By James H. Dameron
*Fort Worth Bureau, The Oil and Gas Journal*

FORT WORTH, Tex., Feb. 27.—Opening of a new pool and a long extension of another featured the week in Ranger district, while extensions were the most important developments in Wichita district, and the long-sought price raise in Panhandle was the most cheering news for that section.

Two miles east of Grosvenor and 2½ miles northeast of the Smith-Ellis Pool in Brown County, Cranfill & Reynolds' No. 1 W. E. Hill, SW cor. Sec. 63, Myrum Mudgett Survey, appears to have opened a new high sand pool. Sand was topped at 1,300 feet and penetrated 1 foot, and 600 feet of oil rose in the hole. Tankage is to be erected before drilling in.

One of the most important transactions in Brown County oil circles during the week was the purchase of a half interest in the 11-acre tract leased by Clark-Buffalo Oil Corp. A 500-bbl. wildcat well was drilled on the lease a few days ago. E. P. Woodruff and James L. White sold their half interest in the lease to the Clark-Buffalo Corp. for $22,000 cash. Two wells are being drilled on the tract at present and locations for two more have been made. The discovery well is surrounded by dry holes within a radius of one-half mile.

The Pandem-Houghton Pool reported a few more completions during the week, and one well is believed to be extending the Pool on the west side a short distance. None of the recent completions are of the caliber of the initial well in the pool.

### Cook Ranch Extended

A significant extension was made to the Cook Ranch Pool when Roeser and Pendleton and Marland Oil Co.'s No. A-1-62 in the NW part of Section 62, E.P.R.R. Survey, came in making 600 bbls. from sand at 1,336-50 feet. This well extends the Cook Ranch Pool, 1½ miles to the north. The pool has been slow in being developed because the operators did not desire to hasten it. It is controlled by Roeser and Pendleton and Marland Oil Co.

Two miles south of Coleman, in Coleman County, Anzac Oil Co. and Continental Oil Co.'s No. 1 W. R. Gardner, NE cor. B. Ferguson Survey No. 248, is holding up well at 100 bbls. of 41.3 gravity oil daily. The well had gas at 2,296-2,302 feet and the oil pay was at 2,302-06 feet, production is coming from the lower portion of Strawn series. Some geologists are of the opinion production is coming from the Gray sand which produces in the northeastern part of Coleman County.

### Gohlke Producers

In Wichita Falls district interest was centered principally around the Gohlke Pool in Archer County. Two new wells were completed last week, bringing the total producers for that area up to five. Nine wells are being drilled in the pool at present.

Completions in the Wichita Falls district showed a slight increase during the past week. And new locations were scattered over the area, both in proven territory and in wildcat territory. Operations in southeast Wilbarger County, more especially in the Rock Crossing area, slowed up somewhat during the past few days as a result of water shortage. Some excitement was created when a deep test in Jack County got a showing around 3,300 feet. The test is C. S. Leidecker and associates' No. 1 First State Bank of Bryson, approximately the center of the north line O. P. McKensey Survey No. 2, A-190. A showing of oil was found at 3,290-3,303 feet, break was encountered from 3,303-10 feet, shale was encountered from 3,310-29 feet and 150,000 feet of gas and another show of oil was had at 3,329-39 feet. There is 600 feet of open hole and 5⅜-inch casing is to be run when the hole is cleaned so a test can be made.

Two new wells are nearing completion in the recently discovered shallow area northwest of Loving in Young County, but neither well appears to be as good as the discovery well drilled by the Pennell Oil Co. and Cunningham and which made 100 bbls. of 40 gravity oil the first eight hours from pay at 504-15 feet. One of the new wells in the making has the pay at 576-86 feet and is estimated good for 45 bbls. daily, while the other is estimated good for 60 bbls. daily at 566-83 feet.

### Panhandle Declines

The raise in Panhandle crude last week was the most interesting development to those operators. That crude was raised on an average of a dime a barrel. Classed as a sour crude and on a weak market, considerable Panhandle crude was going to storage, but in recent weeks crude has no longer been moving to storage in the Panhandle. Production at the same time was steadily declining.

The most interesting of the wildcats in the Panhandle was McMan Oil & Gas Co.'s No. L-A Yake, Section 39, Block 47, H.&T.C. Survey, Hutchinson County. The well created considerable excitement when it encountered 6,000,000 feet of gas at 2,892-2,900 feet in lime. The excitement increased when the well started spraying 10 bbls. per day from 2,990-92 feet. But with the excitement subsided when the well started making 5 bbls. salt water per hour after being deepened to 3,012 feet, where it is shut down for orders. The water was encountered during the drilling of soft lime at 3,009-12 feet.

Another interesting test is Big Bend Oil Co.'s No. 1 Mrs. H. Ledrick, Section 7, Block 5-A, Roberts County. A string of 3-inch casing was set at 5,155 feet and the well is drilling at 5,168 feet.

## WILDCAT OPERATIONS IN PANHANDLE

Week End'ng February 25, 1928

**ARMSTRONG COUNTY**

| Company, Well, Farm, Name, Section and Block— | Remarks— |
|---|---|
| United Oil & Trust Co.'s No. 1 J. P. Reck, Sec. 162, Blk 4, H. & G. N. Sur. | Drlg. lime, 3,702 ft. |

**BRISCOE COUNTY**

| | |
|---|---|
| C. S. Rice's No. 1 J. C. Anderson, SE cor. NW NW, Sec. 22, Blk. B-3, B. S. & F. Sur. | S.D., 1,620 ft. |

**CARSON COUNTY**

| | |
|---|---|
| Amarillo Oil Co.'s No. 1 E. S. Polling, C NE of N 80 acres of NE, Sec. 12, Blk. Y-2, B. & B. | Rig. |
| Amatex Dev. Co.'s No. 1 E. S. Polling, Sec. 22, Blk. 2-Y, | T.A., 2,110 ft. |
| Empire G. & F. Co.'s No. 1-A Texas Co. fee, C NE, Sec. 60, Blk. 4, I. & G. N. Sur. | Drlg., 875 ft. |
| Empire G. & F. Co.'s No. 1 White Deer Inv. Co., C SE of Sec. 51, Blk. 4, I & G. N. | Drlg., 1,200 ft. |
| Marston Oil Co.'s No. 1 J. L. Noel | Drlg., 2,880 ft. |
| Skelly Oil Co.'s No. 8 H. Schafer, NE SW SW, Sec. 54, Blk. 4, I. & G. N. Sur. | Bldg. rig. |
| The Texas Company's No. 2 C. R. Garner | 15,000,000 ft. gas. 2,300-25 ft; S.D., 2,425 ft. |
| The Texas Co.'s No. 1 W. H. Cobb, NE SE SE, Sec. 202, Blk. 3, I. & G. N. Sur. (Lease S 100 A SE) | Drlg., 666 ft. |

**CASTRO COUNTY**

| | |
|---|---|
| Colorado O. & R. Co.'s No. 1 M. Slemmons, SW cor. Sec. 73, Blk. M-17, B. S. & F. Sur. | Rig blown down. |
| Mystery Oil Co.'s No. 1 J. I. Crum, SE cor. NE Sec. 333, Blk. M-6, S. K. & K. Sur. | S.D., 510 ft. for csg. |

**CHILDRESS COUNTY**

| | |
|---|---|
| Hoover & Calloway's No. 1 O. L. Tucker, Sec. 736, Haggard Sur. | Spudded and S.D. |
| C. L. Sloane et al's No. 1 B. P. Smith, Sur. 49, F. P. Knott lands | Set 6-in., 2,902 ft; S.D., 3,745 ft. |

**COTTLE COUNTY**

| | |
|---|---|
| Exploration Co.'s No. 1 Richards | Spudded and S.D. |

**DALLAM COUNTY**

| | |
|---|---|
| Wood Bros. et al's No. 1 Capitol Synd., Sec. 19, Blk. 17. | Hole full wtr., 4,007-4,127 ft; S.D., 4,360 ft. |
| Marland Oil Co.'s No. 1 A. M. James, C SW W ½ Sec. 21, S. H. McElreath Sur. | T.D., 3,715 ft; U.R. 6-in., 3,665 ft. |
| Marland Oil Co. et al's No. 1 Capitol Synd., Sec. 36, Blk. 18, Capitol Synd. land | S.D., 3,500 ft. |

**DONLEY COUNTY**

| | |
|---|---|
| A. T. Drlg. Co.'s No. 1 F. E. Harrington, Sec. 39, Blk. 3-C | 1,200 ft. wtr., 3,115-22 ft; show gas. 3,140-60 ft; dry G.W., 3,-200-93 ft; T.D., 3,498 ft; set 5-in. csg., 3,460 ft. |

**FLOYD COUNTY**

| | |
|---|---|
| Expltn. Co.'s No. 1 S. H. Boone, C. C. H. Johnson Sur. | Spudded and S.D. |
| Expltn. Co.'s No. 1 Land & Cattle Co. | S.D., 730 ft. for orders. |
| Hoffer Oil Corp.'s No. 1 Nelson | Spudded and S.D. |

**GRAY COUNTY**

| | |
|---|---|
| Archer Blake's No. 1 Turneaux, SW cor. Sec. 111, Blk. B-2 | S.D., 255 ft. |
| Bay Shore Oil Co.'s No. 1 C. W. Bradford, Sec. 143, Blk. 2-B | T.D., 2,666 ft; S.L.M. shot with 10 qts. to loosen bit and 8-in. collapsed; S.D., 2,795 ft. |
| Biggs et al's No. 1 Morse, SW cor. Sec. 3, Blk. 26, H. & G. N. Sur. | Drlg., 409 ft. |
| Cole O. & G. Co.'s (was Magdalene Oil Co.'s) No. 1 J. E. Williams, Sec. 17, Blk. 1 | S.D., 3,860 ft. |
| Danciger O. & R. Co.'s No. 7 W. Jackson, Sec. 83, Blk. B-2, H. & G. N. Sur. | 3,000 ft T.D.; making 5,000,000 ft. gas from 2,779-3,000 ft. and 5 bbls. oil; stdzng., 3,000 ft. |
| Danciger O. & R. Co.'s No. 9 W. Jackson, NW cor. NE NW, Sec. 88, Blk. B-2 | Drlg., 2,310 ft; lime. |
| Danciger O. & R. Co.'s No. 10 W. Jackson, NE cor. NW NW, Sec. 88, Blk. B-2 | Drlg., 2,014 ft. |
| Danciger O. & R. Co.'s No. 1 W. Crank, SW cor. NW, Sec. 163, Blk. 3, I. & G. N. Sur. | Bldg. rig. |
| Danciger O. & R. Co.'s No. 1 A. Chapman, SW cor. NW, Sec 7, Blk. 26, H. & G. N. Sur. | U.R. 8¼-in. csg., 1,510 ft; T.D., 1,550 ft. |
| Danciger O. & R. Co.'s No. 1 C. W. Bradford, NE cor. SE, Sec. 123, Blk. B-2, H. & G. N. Sur. | Drlg., 2,000 ft. |
| Danciger Oil Co.'s No. 1 J. S. Morse, SE cor. NE SW, Sec. 2, Blk. 26, H. & G. N. | Rig. |
| Delaney et al's No. 3 W. Jackson, SE cor. NE SW, Sec. 88, Blk. B-2 | Drlg., 2,630 ft. |
| Delaney et al's No. 6 Jackson, SW cor. E half, SW Sec. 88, Blk. B-2, H. & G. N. Sur. | Cmt. 8¼-in., 2,000 ft. |
| Donley Gray Oil Co.'s No. 1 J. W. Gordon, Sec. 79, Blk. 3 | Wtr., 3,480 ft. and 3,420 ft; show oil; H.F.W., 3,650 ft; T.D. 3,-870 ft; U.R. 6-in. csg., 3,852 ft; drlg. hard sandy lime, 4,000 ft. |
| Delmar Oil Co.'s No. 1 F. Foster, NW cor. SW, Sec. 55, Blk. B-2, H.&G.N. Sur. | Location. |
| Edwards et al's No. 1 E. J. Case, NE cor. Sec. 182, Blk. B-2, H. & G. N. Sur. | 70,000,000 ft. gas. 2,512-2,630 ft, drlg. by bit, 3,028 ft; 1,000 ft. oil in hole; top G.W., 3,034 ft. |
| Empire G. & F. Co.'s No. 1 A. Barrett, C SW, Sec. 132, Blk. 3, I. & G. N. Sur. | Cmtd. 8¼-in. csg., 2,163 ft. |
| Empire G. & F. Co.'s No. 1 E. J. Case, C NE, Sec. 180, Blk. B-2, H. & G. N. Sur. | Fish. for bit, 2,080 ft. |
| Empire G. & F. Co.'s No. 1 S. A. Cobb, NW cor. NE, Sec. 64, Blk. 25, H. & G. N. Sur. | Drlg., 1,650 ft. |

(Continued on Page 223)

**Estimated Daily Average Production**
**North Central Texas**
**Week Ending February 25**

**Panhandle**

| | |
|---|---|
| Carson County | 6,925 |
| Gray County | 18,985 |
| Hutchinson County | 47,295 |
| Moore County | ..... |
| Potter County | 20 |
| Wheeler County | 910 |
| Total this week | 74,145 |
| Total last week | 77,855 |
| Decrease | 3,710 |

**Wichita Falls District**

| | |
|---|---|
| Archer County | 19,625 |
| Baylor County | 72 |
| Clay County | 518 |
| Cooke County | 3,586 |
| Jack County | 1,420 |
| Montague County | 9,288 |
| Throckmorton County | 1,031 |
| Wichita County | 26,027 |
| Wilbarger County | 10,114 |
| Young County | 8,731 |
| Total this week | 80,420 |
| Total last week | 81,029 |
| Decrease | 609 |

**Ranger District**

| | |
|---|---|
| Brown County | 13,030 |
| Callahan County | 3,887 |
| Coleman County | 1,675 |
| Comanche County | 1,300 |
| Palo Pinto County | 452 |
| Ranger | 10,161 |
| Shackelford County | 7,166 |
| Stephens County | 8,573 |
| Total this week | 46,442 |
| Total last week | 46,257 |
| Increase | 185 |
| Grand total this week | 201,007 |
| Grand total last week | 205,141 |
| Decrease | 4,134 |

## PANHANDLE COMPLETIONS

**Week Ending February 25**

### Bailey County

Humble Oil & Refining Co.'s No. 1 W. H. Fuqua, C E half, Section 117, Block A, Melvin, Blum & Blum Survey, had a hole full of water at 4,100 feet and has been abandoned. Gibson Oil Co. and others' No. 1 Webb Miller, NE cor. Section 15, League 136, Swisher County School Land, has temporarily abandoned the derrick.

### Gray County

Neudegate and others' No. 1 A. Chapman, NE cor. E half SE, Section 52, Block 25, had a rainbow show at 2,820-25 feet and a hole full of water at 3,014 feet and has been abandoned. Phillips Petroleum Co.'s No. 1 J. B. Bowers has temporarily abandoned the cellar. Same company's No. 1 W. Jackson was drilled to a total depth of 3,030 feet and the well swabbed 30 bbls. from the granite wash at 2,845-80 feet. The well made a little salt water at 3,018 feet. Same company's No. 2 W. Jackson swabbed 100 bbls. daily from the granite wash found at 2,832-2,984 feet and was drilled to a total depth of 3,026 feet. Same company's No. 1 Jackson-Riley swabbed 125 bbls. from the pay at 2,942-90 feet. Reme Oil Co.'s No. 1 B. E. McKinney has moved the rig and abandoned the location.

### Hutchinson County

Navajo Oil Co.'s No. 1 E. Cockrell was drilled to a total depth of 3,055 feet. After a shot of 390 quarts at 2,960-3,050

(Continued on Page 169)

# Hendricks Pool Expected to Go Higher

## Less Alarm Being Felt About Water Situation. Other West Texas Fields Are Believed to Be Under Control

By James H. Dameron
*Fort Worth Bureau, The Oil and Gas Journal*

FORT WORTH, Tex., Feb. 27.—Hendricks, in Winkler County, overshadowed practically all other areas in West Texas. However, noteworthy developments were reported from the many other areas. Hendricks is proving to be the disturbing factor in West Texas that many close observers have predicted it would be.

Last week the pool soared to a new daily average peak of 134,549 bbls. to send production of the entire West Texas area up to a new peak of 310,669 bbls. Hendricks attained its greatest peak during the 24-hour period ending February 23 by gauging 152,229 bbls. Sunday morning's gauge showed the pool 10,000 bbls. under peak and Monday morning the field produced 135,833 bbls. for the previous 24 hours.

### Revising Estimates Upward

At the same time water encroachment contined to spread in other wells but developments of the Independent Oil & Gas Co.'s No. 1 Cowden, SE NW NW Section 36, Block B-5, are causing several well informed to revise their estimate upwardly on Hendricks and also prompting those same authorities to be less alarmed about the water situation.

No. 1 Cowden caught the salt at 952 feet, which was 90 feet higher than the nearest producer. It appears at this time the well is getting the lime high. If it tops the lime high and makes a producer it will swing the contour lines out to the east. As contoured at present the Hendricks structure is a little over a mile wide and better than 5 miles long with no indications of a closure on the north end. No. 1 Cowden is drilling plug at 2,285 feet, where 8¼-inch casing was cemented in brown lime.

Those going on the assumption the well will be high are less concerned about the water encroachment on the west flank, which has encroached both laterally and vertically. If the structure is much wider than was first believed the water would still be low on the west flank of the structure. Regardless, Hendricks is generally believed to be a structure that will produce a great volume of crude. It appears Hendricks will be the key to the West Texas situation for some time. Yates has been fairly well defined and its production restricted by a proration plan. Prolific deep lime production in Howard County can be figured to be kept under control and it is not likely the south end of the Church & Fields Pool in Crane County will be drilled up.

### Field's Biggest Well

Besides disturbing the present contour lines of the pool, Independent Oil & Gas Co. brought in the field's biggest well with its No. 2 Vardeman, Section 41, Block B-5. The well topped the pay at 2,794 feet and made 1,200 bbls. in one hour and was then pinched down to only a fraction of its potential production. It is one location east and one location north of Roxana corporation's No. 1-D which previously held the record by doing 1,115 bbls. in one hour. The latter well is showing a small percentage of water. Another big well completed was Roxana Corp.'s No. 2-A Hendricks, which came in making 700 bbls. per hour from 2,741-46 feet. The well was pinched and made 2,575 bbls. the first 14 hours.

An important development during the week was the discovery of another pay zone in Gulf Production Co.'s No. 1 T. G. Hendricks, NW cor. Section 34, Block B-5. It was the first big well in the field and flowed 2,550 bbls. at 2,842 feet. During December water almost drowned out the oil and after some trouble that horizon was cased off and another zone found which made 300 to 400 bbls. daily for several days while drilling. The last pay was topped at 2,990 feet and the whole bottomed at 3,014 feet. During the first 24 hours it made 900 bbls. and for the second 24-hour period it produced 936 bbls. The well was deepened on the theory advanced some time ago that wells making cut oil from one of the upper pays could case that pay off and drill for a deeper pay.

Some of the wells in the field are so deep in the lime that little is expected if they are drilled deeper when water encroachment drowns out production. However, Landreth corporation's No. 1 Ida Hendricks, SE SW Section 29, Block B-5, was drilled 421 feet in the lime early this week and flowed 3,030 bbls. the first 13 hours. This well is at present producing from 3,080-84 feet and formerly showed sulphur water when it was 348 feet in the lime.

### Northeast of the Field

Over on the northeast side of the field Southern Crude Oil Purchasing Co.'s No. 1-T-90 Hutchins, NE E half SE Section 47, Block 26, was being followed closely. Monday the well was drilling in lime at 2,570 feet with nothing showing. The diagonal northeast offset, Amerada corporation's No. 1 Walton, is shut down at 2,471 feet without any changes in production. The sulphur in the gas ate away the connections on the well and new ones are being placed there. Gibson & Johnson's wildcat test, No. 1 Leck, C SW Section 3, Block 74, is shut down in salt and red bed at 2,015 feet for boiler repairs. No change has been reported for the wells in the north part of Hendricks. On the south end of the pool Sheldon & Burdens' No 1 Ida Hendricks, Section 28, Block B-5, is being bailed and cleaned out at 3,243 feet after two heavy shots.

An example of the cavity conditions in Hendricks is well illustrated by the Pure Oil Co.'s No. 1-C, NW cor. SE Section 45. A crevice was encountered at 1,418 feet and it required 1,200 sacks of cement to fill it.

### Yates Field Extended

Yates, Pecos County, finished the week with its usual quota of large shallow producers, the biggest of which was a 2,200-bbl. well drilled by the California Co. One of the most interesting developments in Yates was the finding of pay much shallower than the usual Pecos pay in Gulf company's No. 8 I. G. Yates, Runnels County School Land, Abstract 2,169. The well pumped 620 bbls. the last 24-hour gauge from 405 to 449 feet. The crude tests 21 gravity and is showing 20 per cent b.s. and water which readily treats out.

Phillips Petroleum Co.'s No. 1 Smith, Section 39, Block 194, G.C.&S.F. Survey, and which extended the Yates Field one-half mile west, has been pinched in to 35 bbls. daily. The well is bottomed at 1,355 feet and is 100 feet in the pay and 135 feet in lime. It will not be opened for a test until tankage being shipped from Breckenridge is erected. No water is showing. It was previously estimated good for 250 bbls. per day, but since it is making 35 bbls. daily restricted several are of the opinion the producer may go above 250 bbls. a day. It is considered to have proven up approximately 200 acres which would give it around 50 bbls. daily under the present proration plan.

### Runnels County Well

The second producer in the Elm Creek Pool, Runnels County, was completed when Vacuum Oil Co. and Lew Ladd and associates' No. 2 R. L. McMillan was put on the pump. It is estimated good for 200 bbls. of crude and 15 bbls. of water. It is believed the water is coming from behind the casing.

### Pipe Lines and Storage

Illinois Pipe Line Co. is scheduled to start running crude through its 137-mile line from Del Rio tank farm in Val Verde County to connect with the Humble trunk line outlet to seaboard, by March 1. The line connects with the Humble company at Lytle station.

A rumor has been persistent that Humble Oil & Refining Co. is planning to embark on a large storage building campaign in West Texas. It is reported the company will build forty-five 55,000-bbl. capacity tanks which would give that company approximately 2,500,000 bbls. of additional storage. The report, however, has not been confirmed.

Roxana corporation has started construction work on the second of its 1,000,-000-bbl. concrete storage tanks. The first tank was started near Monahans in Ward County and construction work on the second tank was started at the site near McCamey a few days ago. It was reported in some quarters that the Roxana corporation would disturb the proration plan in Yates upon completion of its 3,000,-000-bbl storage project. This rumor was spiked, however, by Roxana corporation officials who are quoted as saying they will continue to do everything in their power to maintain present reasonable basis of development in Pecos and that they are opposed to breaking the proration agreement existing. The building of the giant tank at Monahans is being rushed by night work. Flood lights illuminate the 13 acres so crews may work.

Another outlet for West Texas crude wil lbe through the California Co.'s 8-inch line from Pecos City to El Paso, Tex. That company is building a refinery in El Paso. Right-of-way buyers are purchasing rights of way for the line. Southern Crude Pipe Line Co. has finished construction work on an additional 6-inch line from Hendricks to Wickett. Gulf Production Co. has purchased a tank farm site in the southeast of Section 32, Block B-5, Winkler County.

## WILDCAT OPERATIONS IN WEST TEXAS

Week ending February 25, 1928

**ANDREWS COUNTY**

| Company, farm and location— | Remarks— |
|---|---|
| J. S. Cosden's No. 1 Ratliff & Bedford, C SE Sec. 3, Blk. 73, Public School Land | Top salt 1,585 ft.; shut down 4,116 ft.; will deepen. |
| Deep Rock Oil Co.'s No. 1 W. J. Harris, C SE Sec. 12, Blk. A-46, Public School Land, elev. 3,167 ft. | Hole full fresh water 1,050 ft.; top salt 1,690 ft.; shut down 2,770 ft. for casing. |
| B. B. McKennon's (was Neff et al's) No. 1 J. S. Means, C SE Sec. 12, Blk. A-35, Public School Land | Set 8-in. 1,580 ft.; top salt 1,930 ft.; shut down for casing 3,376 ft. |

**BORDEN COUNTY**

| | |
|---|---|
| Dixon Creek Oil Co.'s No. 1 Clayton & Johnson | Set 15½-in. casing 375 ft.; drlg. by tools 540 ft. |
| Marland Oil Co.'s No. 1 G. E. McDavid, C SW Sec. 156, Blk. 25, H. & T. C. Survey., elev. 2,310 ft. | Top lime 2,410 ft.; set 8-in. 2,745 ft. |
| Marland Oil Co.'s No. 1 Alexander Murphy, C SW Sec. 66, Blk. 25, H. & T. C. Sur. (3,250-ft. test) | Location. |

**BREWSTER COUNTY**

| | |
|---|---|
| Cowden & Bowser's No. 1 Jackson & Harmon, C N half Sec. 1, Blk. 331 | Skidding rig. |
| J. M. Hickey's No. 1 Jackson & Harmon, NE cor. Sec. 182, Blk. 9, G. H. & S. A. Sur. | Shut down 910 ft. |
| Mid-Kansas O. & G. Co.'s No. 1 Turney, Sec. 77, Blk. 213, T. & St. L. Sur. | Drlg. 2,950 ft. |
| Reese & White's No. 1 Kimbale, C NE Sec. 204, Blk. 9, G. H. & S. A. Sur. | Drlg. 1,350 ft. |
| Van McPhail's No. 1 McIntyre, SE cor. Sec. 59, Blk. 352, 7 mi. S of Alpine | Drlg. 1,700 ft. |
| Wilcox & Anderson's No. 1 Gage, Sec. 8, Blk. 300, T. C. R. R. Sur. | Underreaming 1,901 ft. |

**COKE COUNTY**

| | |
|---|---|
| W. H. Brown et al's No. 1 W. L. Foster, SE cor. Sec. 142, Blk. 2, H. & T. C. Sur., elev. 2,222 ft. | Run. 6-in. casing 3,189 ft.; drlg. 3,300 ft. |
| Lipan Oil Co.'s No. 1 S. M. Conner, Sec. 71, Blk. 2, H. & T. C. Sur. | Show oil 1,224-34 ft.; shut down lime 3,317 ft. |
| Lipan Oil Co.'s No. 1 E. C. Rawlings, Sec. 390, Blk. 1-A, H. & T. C. Sur., elev. 2,750 ft. | Total depth 2,736 ft.; shut down. |

**CONCHO COUNTY**

| | |
|---|---|
| Parks & Lawson's No. 1 Schultz | Show oil 925 ft.; shot with 40 and 30 qts.; no results; shut down 1,500 ft. |
| The Exploration Co.'s No. 1 Hartgrove, Blk. 240, J. Schouch Sur., elev. 1,718 ft. | Set 10-in. 760 ft.; shut down 940 ft. |

(Continued on Page 173)

### WEST TEXAS

**Estimated Daily Average Production for the Week Ending February 25**

| | |
|---|---|
| Crane County | 80,181 |
| Crockett County | 2,914 |
| Ector County | 12 |
| Fisher County | 235 |
| Glasscock County | S. D. |
| Howard Coun.y | 3,981 |
| Jones County | 1,263 |
| Loving County | 145 |
| Mitchell County | 3,355 |
| Pecos County | 48,308 |
| Reagan County | 20,465 |
| Runnels County | 71 |
| Scurry County | 45 |
| Upton County | 15,145 |
| Winkler County | 134,549 |
| Total this week | 310,669 |
| Total last week | 299,250 |
| Increase | 11,419 |

### WEST TEXAS

**Daily Average Production by Leases for the Week Ending February 25**

**Crane County**

| Company and Lease— | Wells | Bbls. |
|---|---|---|
| Church et al: | | |
| University | 1 | 112 |
| Church & Weekley: | | |
| University | 3 | 1,244 |
| Church & Fields: | | |
| Duoll-University | 1 | 107 |
| Eastland Oil & Collett: | | |
| University | 8 | 4,156 |
| Gulf Prod. Co.: | | |
| All leases | 66 | 18,369 |
| Humble O. & R. Co.: | | |
| University | 13 | 4,831 |
| Independent O. & G. Co.: | | |
| University-A | 5 | 1,102 |
| University-B | 2 | 1,071 |
| Landreth Prod. Corp.: | | |
| Cowden-Anderson | 16 | 8,574 |
| Magnolia Pet. Corp.: | | |
| University-Hardwicke | 14 | 2,816 |
| University-O'Keefe | 12 | 637 |
| State-Lasse.er | 3 | 154 |
| Magnolia et al: | | |
| University | 4 | 65 |
| Pecos Oil Co.: | | |
| University | 15 | 4,096 |
| Prairie O. & G. Co.: | | |
| University | 5 | *379 |
| State Lasseter | 7 | *12,079 |
| Simms & Atlantic: | | |
| University-A | 9 | 2,732 |
| University-B | 1 | 54 |
| University-C | 8 | *4,836 |
| University-D | 12 | *4,799 |
| University-E | 1 | 177 |
| Stidham & Thrasher: | | |
| University | 1 | 11 |

| | | |
|---|---|---|
| The Texas Company: | | |
| University | 1 | 212 |
| University-Beasley | 1 | 10 |
| Tidal Oil Co., et al: | | |
| University-B | 2 | 56 |
| University-C | 1 | 32 |
| University-E | 1 | 74 |
| University-F | 7 | *2,507 |
| University-G | 3 | *451 |
| University-H | 2 | 25 |
| University-I | 8 | *3,560 |
| Total Church & Fields-McElroy Pools | 233 | 79,329 |
| Average per well | | 340.42 |
| **Miscellaneous Crane County** | | |
| Gulf Prod. Co.: | | |
| Wadell | 1 | 25 |
| Independent O. & G. Co.: | | |
| Hughes | 1 | 7 |
| McMan O. & G. Co.: | | |
| Hughes | 2 | 63 |
| Marland Oil Co.: | | |
| All leases | 15 | 568 |
| The Texas Company: | | |
| King | 9 | 189 |
| Union Land-F | 1 | 0 |
| Miscellaneous total | 29 | 852 |
| Grand total Crane County | 262 | 80,181 |
| Average per well | | 306 |
| **Pecos County** | | |
| Pandem Oil Co. et al: | | |
| Pecos River Bed | 5 | 331 |
| California Oil Co.: | | |
| Yates, Lease 1 | 11 | 2,628 |
| Smith, Lease 1 | 1 | 82 |
| Smith, Lease 3 | 10 | 4,305 |
| Gulf Prod. Co.: | | |
| All leases | 10 | 6,159 |
| Humble O. & R. Co.: | | |
| M. A. Smith | 6 | 2,404 |
| M. A. Smith-B | 4 | 1,425 |
| Kirby Pet. Co. & Edson: | | |
| J. H. Tippett | 1 | 239 |
| Marland Oil Co.: | | |
| Yates-A | 10 | 953 |
| Mazda & Savoy Oil Co.: | | |
| M. A. Smith | 1 | 240 |
| McMan & Marland: | | |
| Yates | 15 | 3,845 |
| McMan O. & G. Co.: | | |
| J. H. Tippett | 2 | 530 |
| Mid-Kansas & Transcontinental: | | |
| Yates-A | 13 | 3,464 |
| Yates-B | 22 | 4,011 |
| Yates-C | 9 | 2,947 |
| Yates-D | 2 | 486 |
| Yates-E | 1 | 159 |
| Yates-F | 1 | 58 |
| Smith | 2 | 81 |
| Smith-Taylor | 10 | 6,466 |
| Red Bank Oil Co.: | | |
| Smith | 2 | 480 |
| Roxana Pet. Corp.: | | |
| Tippett | 7 | 3,131 |
| Smith | 5 | 919 |
| Simms Oil Co.: | | |
| Smith | 6 | 2,965 |
| Texon O. & L. Co.: | | |
| Yates | 2 | 0 |
| Total Yates Field | 157 | 48,308 |
| Average per well | | 308 |
| **Winkler County** | | |
| Atlantic O. P. Co.: | | |
| Grisham-Hunter | 4 | 5,132 |
| Grisham-Hunter-E | 1 | 6,969 |
| Ida Hendricks | 1 | 333 |
| Ida Hendricks-D | 2 | *3,151 |
| Cranfill & Reynolds: | | |
| Ida Hendricks | 2 | 4,975 |
| Grisham-Hunter-B | 1 | 245 |
| Gulf Prod. Co.: | | |
| T. G. Hendricks | 7 | 12,411 |
| Humble O. & R. Co.: | | |
| Grisham-Hunter-4 | 3 | *7,921 |
| Ida Hendrick-B | 3 | 4,929 |
| Independent O. & G. Co.: | | |
| Grisham-Hunter | 6 | *11,700 |
| Grisham-Hunter-B | 1 | 10,301 |
| Hendricks | 1 | 38 |
| Ida Hendricks-B | 1 | 345 |
| Landreth Prod. Corp. & Roxana: | | |
| Grisham-Hunter | 2 | 5,642 |
| Ida Hendricks-A | 3 | 4,180 |
| Magnolia Pet. Co.: | | |
| Ida Hendricks | 5 | 3,825 |
| Murchison & Cranfill Bros.: | | |
| Grisham-Hunter | 2 | 190 |
| Grisham-Hunter-C | 1 | 110 |
| Grisham-Hunter-B | 1 | 920 |
| Republic Prod. Co.: | | |
| Grisham-Hunter-A | 1 | 9,672 |
| Grisham-Hunter-B | 1 | 55 |
| Roxana Petroleum Corp.: | | |
| Scarborough | 1 | 20 |
| Roxana Pet. Corp. et al: | | |
| Grisham-Hunter-A | 1 | *2,516 |
| Grisham-Hunter-D | 2 | *5,280 |
| Ida Hendricks-B | 1 | *1,099 |
| Ida Hendricks-C | 5 | *6,379 |
| Southern Crude Co.: | | |
| T-67 Hendricks-A | 1 | 270 |
| T-67 Hendricks-C | 4 | 1,420 |
| T-67 Ida Hendricks-B | 1 | 575 |
| T-67 Hendricks-F | 1 | 1,662 |
| T-88 Ida Hendricks-A | 1 | 0 |
| T-88 Ida Hendricks-A | 1 | 475 |
| T-88 Hendricks-B | 5 | 5,002 |
| T-88 Ida Hendricks-C | 6 | 3,374 |
| T-88 Hendricks-I | 1 | 274 |
| T-89 Grisham-Hunter-A | 1 | 0 |
| Texon O. & L. Co.: | | |
| Grisham-Hunter-A | 1 | $3,028 |
| Grisham-Hunter-B | 2 | 2,861 |
| Pure Oil Co.: | | |
| Grisham-Hunter | 3 | 1,425 |
| Grisham-Hunter-B | 1 | 1,827 |
| Turman et al: | | |
| Ida Hendricks | 5 | 4,018 |
| Total Winkler County | 94 | 134,549 |
| Average per well | | 1,431.4 |

*Pinched in. †No. 2 shut in.

# Late News from the Field

### ROCKY MOUNTAIN AREA

DENVER, Colo., Feb. 28. — Ohio Oil Co.'s No. 3 Sonners, in Section 8-51-100, Oregon Basin structure, Wyoming, completed in Embar Tensleep series a year ago and shut in with an estimated capacity all the way from 1,000 to 30,000 bbls., was opened to capacity the past week and flowed 447 bbls. the first 24 hours, 345 bbls. the second period and 399 the third 24 hours. It is considered possible that the well having stood shut in for nearly a year may have resulted in cavings and that cleaning out will increase the flow. The pressure dwindled until heads finally made only a few barrels at each flow.

Texas Production Co.'s No. 10 Knowlton, Section 33-5-91, Moffat Dome, Colorado, which is being deepened into the Sundance sand from 4,400 feet, continues to show increase and made 480 bbls. in 24 hours, total depth 4,468 feet. It had been making 100 bbls. from 26 feet of sand. Drilling is continuing.

### WEST TEXAS

FORT WORTH, Tex., Feb. 28.—Magnolia Petroleum Co.'s No. 2 Dora Roberts, in Howard County, Roberts Pool, made 2,700 bbls. the first 22 hours and is shut down for storage. The well had the first pay at 2,974-77 feet and the second at 2,984-86½ feet.

In Elm Creek, Runnels County, Vacuum Oil Co. and Lou Ladd and associates' No. 2 McMillan averaged 103 bbls. of oil and from 4 to 17 bbls. of water the first four 24-hour gauges. Cranfill and Reynolds' No. 1 W. E. Hill, Myriam Mudgett Survey, Brown County, a new pool opener, made 46 bbls. the first 24 hours from sand at 1,300-06 feet. Independent Oil & Gas Co. gave the south 20 acres of its 50-acre lease for the well. Roeser and Pendleton, Fort Worth operators, own the south 50 acres.

Three new wells were showing water in the Hendricks Field Tuesday morning. Landreth Production Co.'s No. 1 Ida Hendricks is showing 3 per cent, Gulf Production Co.'s No. 5 Hendricks is showing 5 per cent, Turman and Maxwell's No. 1 Hendricks is showing 5 per cent and No. 2 is showing 2 per cent.

### GULF COAST

HOUSTON, Tex., Feb. 28.—Possibilities of extensive production on the north side of the present South Liberty Field of Liberty County, Texas, were given a further boost Monday morning when The Texas Company's No. 1 Green came in flowing 2,500 bbls. of pipe line oil daily. The well is a wildcat over a mile north of the main field limits. The oil tests 25 gravity. The Texas Company's well follows the completion on January 20 of Yount Lee Oil Co.'s No. 1 Mitchell, which extended the South Liberty Field about 500 feet north with a 200-bbl. pumping well. Production in the latest well is much higher with the sand at only 2,288 feet with 30 feet of 4½-inch liner. Yount Lee Co.'s extension well found the pay at 3,485 feet at approximately the same depth in the main part of the field. The north extension of the South Liberty Field now is one of the most active spots in the coastal territory, with three other tests drilling, all having been started since the extension was opened.

Nash Dome, Fort Bend County, got its third good well in the past three weeks when Rycade Oil Corp. Tuesday morning brought in its No. 22 Wisdom flowing 2,250 bbls. of pipe line oil daily from sand at a total depth of 4,534 feet.

### SOUTHWEST TEXAS

SAN ANTONIO, Tex., Feb. 28. — Oil standing to a depth of 600 feet in P. E. Hill and others' No. 1 Harlan Horney in Irion County, 2 miles east of Mertzon, with pay barely topped at 1,270 feet, today offered possibilities of opening a new field only 26 miles west of San Angelo. Work is suspended until other operators arrive, with the hole caving somewhat, 8¼-inch casing being landed only to 1,134 feet. The oil appears of about 35 gravity and is free from water. The well is 150 feet from the north line and 450 feet from the east line of Section 1, Block 3, H.&T.C. Ry. Co. Survey.

### OKLAHOMA

The Greater Seminole Field produced 307,520 bbls. for the 24 hours ending Tuesday, 7 a. m. The production by pools was:

| | |
|---|---|
| Little River | 32,722 |
| Bowlegs | 88,458 |
| Earlsboro | 109,725 |
| Seminole | 58,114 |
| Searight | 18,501 |
| Total barrels from 1,085 wells | 307,520 |

The most interesting news from the field was The Texas Company's No. 1 Reed, SW cor. SW Section 12-8-5, which is reported running about 500 feet lower than the Barnsdall Oil Co.'s No. 1 Fife. The Reed well is the only active drilling

(Continued on Page 220)

# CORROSION COMMITTEE RECOMMENDS BUREAU OF STANDARDS ASSOCIATE

ST. LOUIS, Mo., Feb. 25.—Unanimous recommendation that the American Petroleum Institute employ a research associate at the United States Bureau of Standards to study corrosion and means for its minimization, particularly soil corrosion and protective coatings for pipe lines, was made by the newly-formed general committee on corrosion of the Institute which held its first meeting at the Statler Hotel here Thursday and yesterday. Several suggestions were made as to men believed eminently fitted for the work to be done.

The active work of the Institute's general committee on corrosion will be carried on through three subcommittees which were appointed at this meeting. During the meeting it developed that problems pertaining to production, pipe line and storage tank corrosion had much in common and could be grouped advantageously under one subcommittee. Refinery corrosion and marine corrosion presented distinctly different problems and necessitated formation of separate subcommittees. Following are the subcommittees named at the meeting:

Production and pipe line corrosion, W. P. Haseman, chairman; P. R. Applegate, E. P. Bly, Stanley Gill, W. G. Heltzel, J. C. Walker, C. R. Weidner and H. W. Young. Refinery corrosion, H. F. Perkins, chairman; E. S. Dixon, A. E. Harnsberger, Brian Mead, Ralph J. Reed, Walter Sammans and R. E. Wilson. Subcommittee on marine corrosion, L. A. Turnbull, chairman; E. S. Dixon, Brian Mead, H. F. Perkins, Ralph J. Reed, Walter Sammans and J. C. Walker. R. P. Anderson of the American Petroleum Institute is chairman of the general committee on corrosion; F. N. Speller, National Tube Co., vice chairman, and D. V. Strop, American Petroleum Institute, secretary.

### WEST TEXAS COMPLETIONS

**Week ending February 25**

**Andrews County**

Calvin & Belt's No. 1 Ratliff & Bedford, C NE Section 16, Block A-54, was dry and abandoned at 4,003 feet.

**Culberson County**

James H. Gardner and others' No. 1 Radford, C SE Section 29, Block 62, Public School lands, was junked at 635 feet.

**Howard County**

F. H. E. Oil Co.'s No. 1 Dora Roberts topped the pay at 2,515-31 feet and swabbed 150 bbls. the first 12 hours. The well was put on pump and produced 174 bbls. the first 24 hours. Lockhart & Co.'s No. 1 Dora Roberts, Section 157, Block 29, topped the lime at 2,064 feet and was drilled to the pay found at 2,980-3,019 feet and swabbed 100 bbls. per hour. Oeland & McCaldin's No. 1 Dora Roberts, NW cor. SE Section 137, Block 29, was shot with 20 quarts at 1,881-86 feet and with 40 quarts at 1,824-42 feet and the well is making 1,500,000 feet of gas. Schermerhorn Oil Co.'s No. 1 Dora Roberts, flowed 1,500 bbls. the first nine hours from pay found at 2,963-3,000 feet.

**Pecos County**

Humble Oil & Refining Co.'s No. 4 Mrs. M. A. Smith-B topped the pay at 1,522 feet and bottomed at 1,722 feet and the well flowed 87 bbls. per hour. Mazda & Savoy Oil Co.'s No. 2 M. A. Smith, Section 24, Block 194, is a temporarily abandoned location.

Mid-Kansas and Transcontinental Oil Cos. completed three wells in the Yates Pool during the past week. Their No. 7 Smith-Taylor found the pay at 1,380-1,526 feet and made 322 bbls. per hour. Same companies' No. 10 Yates-B, Section 61, Block 1, made 635 bbls. per hour from pay found at 1,208-1,313 feet. Their No. 21 on the same lease topped the pay at 956 feet and bottomed at 1,106 feet and made 2,211 bbls. in eight hours through one 4-inch line.

Moody Oil Corp.'s No. 1 B. T. Corder, C SW Section 77, Block 2, C.C.S.D. Survey, was dry and abandoned at 2,960 feet. Quinby Oil Co.'s No. 2 Bennett, C NW Section 592, Block 105, G.C.&S.F. Survey, had 200 feet of oil in the hole at 1,216-30 feet. The hole filled up with sulphur water at 1,452 feet and was plugged back to 1,412 feet. Having no results after a shot of 130 quarts at 1,353-60 feet, the well has been temporarily abandoned. Quinby Oil Co.'s No. 1 A. A. Gray, Section 593, Abstract 3,009, has been temporarily abandoned at 700 feet. California Oil Co.'s No. 13 I. G. Yates, Lease 1, topped the pay at 1,310-1,482 feet, and the well made 911 bbls. per hour through one 6-inch line. Quinby Oil Co. and others' No. 1 Townsite had a hole full of sulphur water at 3,440 feet and has been temporarily abandoned. Gulf Production Co.'s No. 8 M. A. Smith-A topped the pay at 1,278 feet and bottomed at 1,470 feet and has an estimated production of 7,200 bbls. The well has been pinched to 10 bbls. per hour.

**Winkler County**

Independent Oil & Gas Co.'s No. 5 Grisham-Hunter, SE SW SW Section 34, topped the pay at 2,935-55 feet and had an initial production of 5,000 bbls. pinched. The well is good for 500 bbls. per hour on open flow. Same company's No. 8 Grisham-Hunter, SW NW SW, had an initial production of 4,700 bbls. pinched from pay topped at 2,903-04 feet. Independent Oil & Gas Co.'s No. 2 Vardeman-B topped the salt at 1,800 feet, lime at 2,310 feet, pay at 2,615-45 feet. The oil showing increased at 2,700 feet and the big pay was found at 2,793-94 feet and the well had an initial production of 360 bbls. per hour pinched.

Republic Production Co.'s No. 2 Grisham-Hunter-B, Sec. 41, Block B-5, was drilled to a total depth of 2,980 feet, with a production of 95 bbls. of oil and 40,000,000 feet of gas. Roxana Petroleum Corp.'s No. 2 Ida Hendricks-B found the pay at 2,995-3,053 feet with an initial production of 1,200 bbls. The well has been temporarily completed. Same company's No. 5 Ida Hendrick-C topped the lime at 2,588 feet. The first pay was topped at 2,850-2,935 feet with an increase in oil showing at 2,880-88 feet. The well is being produced from pay at 2,900-03 feet, with an initial production of 1,200 bbls., 3 per cent water and b.s. Same company's No. 2 Grisham-Hunter-D found the pay at 2,750-63 feet and had an initial production of 4,818 bbls.

Southern Crude Oil Purchasing Co.'s No. 5 Ida Hendricks, T-88-C, topped the pay at 2,849 feet and was drilled to a total depth of 3,044 feet with an initial production of 300 bbls. The well was shot with 200 quarts at 2,900-3,030 feet and increased the production to 600 bbls. Turman & Maxwell's No. 7 Ida Hendricks found the pay at 2,720-2,860 and had an estimated production of 2,000 bbls. The well has been temporarily completed.

[DUNN TOOLAGRAM]

OIL WELL DUNN TOOLS

# When Safety Is Vital—

That the super-strength and super-safety of Dunn Super-Safety Elevators is essential in modern deep drilling operations is evidenced by the fact that these elevators have been used on many wells of extraordinary depth.

The illustrations here show the Dunn Super-Safety Automatic Link Release Elevator (Side Door Type) in service on the United North & South Oil Company's Kelly No. 1 Well, in the Luling, Texas field—the deepest well in the Mid-Continent—depth 7,469 feet on February 17, 1928.

This well is headed for 10,000 feet, if necessary, and the Dunn Elevators are O. K. for that and plenty more.

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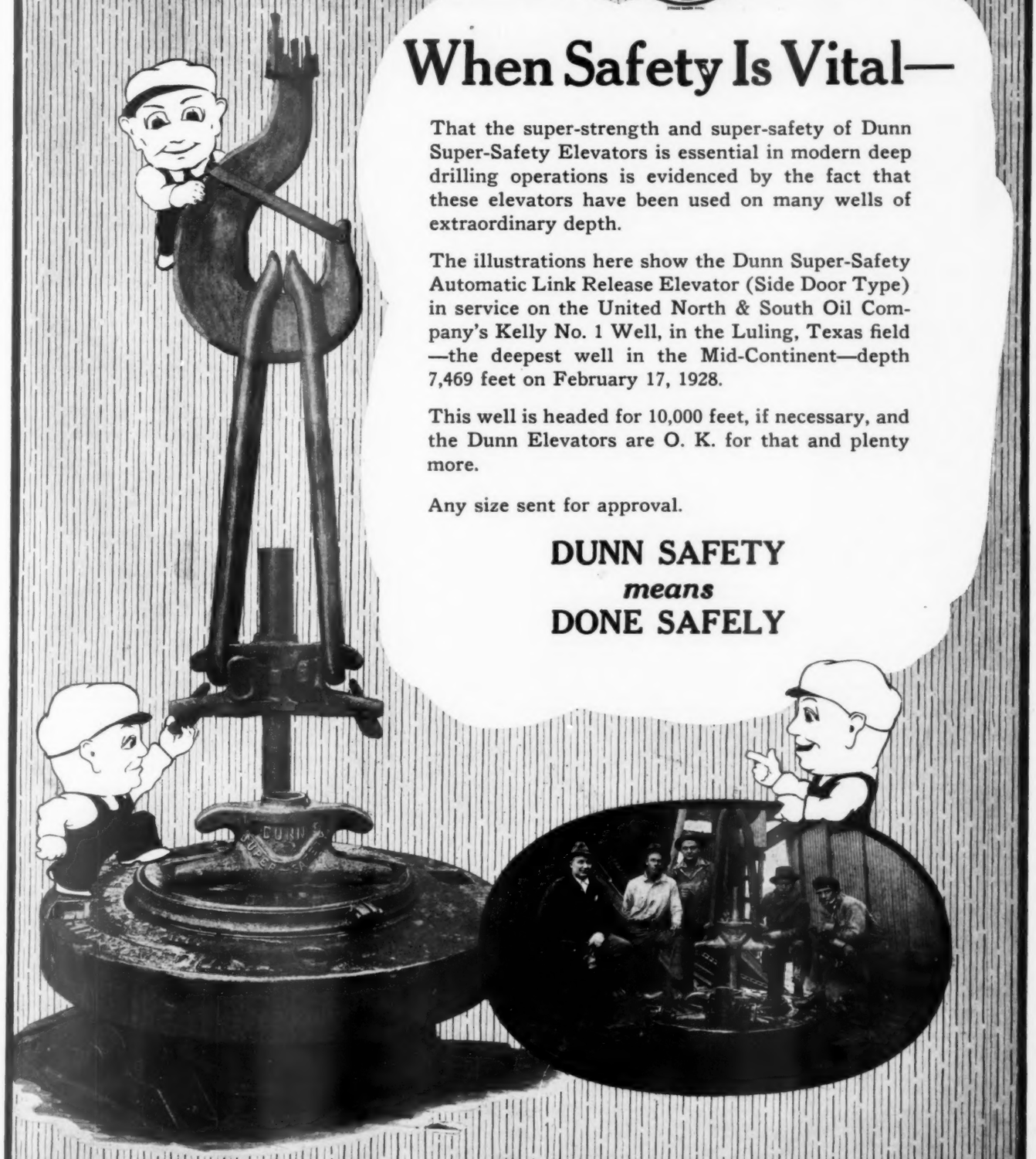


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# Oklahoma Crude in Greater Demand

## Declining Production and Further Postponement of Intensive Drilling Campaign at Seminole Strengthens Situation

By J. L. Dwyer
*Staff Correspondent, Oklahoma Fields*

With the local branches of the industry requiring a breathing spell to familiarize themselves with the new crude price schedule, and to interpret its meaning, last week was rather quiet in this area. The action of the Carter Oil Co. in posting a readjusted schedule giving a more advantageous price for oils of the better gravities, and at the same time effecting some reductions in the inferior grades of crude, is in line with the forecasts made in The Oil and Gas Journal some weeks ago. It is further believed that other price changes, giving the high-gravity crude the benefit of advances, are contemplated and may be expected in this area.

Regardless of any threatened production in the low-grade fields, it is thoroughly apparent that high-gravity crude is still in demand, and that unless some change be made in the picture, many of the crude-purchasing companies in the area are apt to have the sun shining on the bottoms of their tanks before next fall. There is very little free oil in Oklahoma today. In spite of the large production of the Greater Seminole area, certain interests anxious to take on crude from this region have been unable to find anything that looked like free oil. The continuation of the Maud area shut down, and the limited drilling program which is being work out in the Little River Field have done much to strengthen the crude situation, and it is now apparent that it will be at least August of this year before any volume of new production will be forthcoming from Greater Seminole. In addition to this, the harmony of thought prevailing among the operators of this region has now resulted in the wide-open drilling program being twice postponed, and there is the further possibility that it may again be extended.

**Seminole Around 300,000 Bbls.**

The daily production of the Greater Seminole Field during the past week continued a slow drop, and on Friday was down very close to 300,000 bbls., making 304,184 bbls. on that date. With very little to be expected in the line of large wells, and with inside locations furnishing the majority of completions in the field, there is little exciting news. The new inside wells just about make up the difference of the decrease of the older wells, and after a few days they allow the output of the field to sag slightly. Just what will occur when the present crop of drilling wells reaches the sand is problematical, but a sudden drop of 40,000 bbls. would not be surprising. There are now only 78 wells drilling in the five Seminole pools, and as they are completed there will be no new wells started to take their place. The Seminole picture does not look so damp.

In the Maud area, the Barnsdall Oil Co's No. 1 Fife, NE cor. NW, Section 14-8-5, which started the excitement in this area has been pinched in under the shutdown agreement. This well was opened up one day last week, and flowed 300 bbls. in six hours and 45 minutes.

A well on the west side of the Earlsboro Pool which occasioned something in the surprise line was the Atlantic Oil Producing Co., Sinclair Oil & Gas Co. and J. J. Deaner's No. 2 Foreman, NW cor. SW NW Section 18-9-5. This well had the Hunton lime 3,244-48, feet and flowed 350 bbls. daily. It was a surprise, as the bottom had apparently dropped out of the hole, and according to geological calculation, it was running 200 feet low. It is possible that a Hunton lime pool may be developed in this area. Final determination as to whether the well will be carried on down to the Wilcox, or saved as a producer in the Hunton has not been made.

**Pearson Switch Area**

The Pearson Switch area of Pottawatomie County is still offering many puzzling phases. The Magnolia Petroleum Co.'s No. 1 Harper, SE cor. NE SW, Section 25-7-3, which twice went dead after the Indian Territory Illuminating Oil Co.'s well came in, has been revived again, and drilled 4 feet deeper to a total depth of 4,197 feet. It is swabbing 240 bbls. The peculiar performance which has marked every step of the Indian Territory Illuminating Oil Co.'s No. 1 Sullivan, which started all this excitement, again changed this week, when the well started cutting 5 per cent, after making 2,126 bbls. The gravity of the Sullivan well's oil dropped from 38.8 to 34 degrees. Magnolia Petroleum Co.'s No. 1 Harper, NE cor. SE SW, Section 25-7-3, the southwest offset to the Sullivan well, is swabbing 80 bbls., and making one-half bailer of water daily. The Gypsy Oil Co.'s No. 1 Sullivan, NW cor. NE SE, Section 25-7-3, a quarter mile northeast of the I.T.I. well, swabbed 440 bbls. daily from Viola lime 4,298-99 feet. These happenings strengthen the belief that it is a freak pool in the Viola, and that best results are to be expected from the Hunton lime.

**Logan County Activity**

In the Lovell area of Logan County the Roxana Petroleum Corp.'s No. 1 Freelove, SW cor. SW Section 17-19-4w, is making more than 2,000 bbls. daily from the Wilcox sand 6,082-92 feet. It has spread the pool 1 mile to the north, and with the exception of the discovery well it is the best well to be found at Lovell. It came at a time when the Lovell Pool seemed destined to be a bloomer, and has strengthened the idea that a good- sized pool may yet be found in this locality. The well was originally reported as running 40 feet low, but a revision of figures now indicates that the position of the Wilcox sand in this well is slightly higher than the Roxana's McCully, the discovery well in Section 30-19-4w. The McCully well is still producing 2,100 bbls. The Freelove well has not penetrated the body of sand which the McCully well drilled, and many who are well informed on this pool believe that if it were drilled several feet further into the sand, that it would make 5,000 bbls. While this is a matter of speculation, it is possible that deeper drilling in the Freelove well may show improved results.

In the bed of the Arkansas River between Tulsa and Sand Springs, Tulsa County, the Glidden Oil Co. has a good well in the Turkey Mountain sand. It is No. 1 Riverbed, NE cor. NW NW SE Section 15-19-11, and had sand 2,013-19 feet. It started flowing at 80 bbls. hourly, and was choked down to 50 bbls. This well won a race made against the spring rains and river conditions, and in two months the floor of the rig will be several feet below water level.

In Creek County, in the Hall-Donnelly area, the Empire Oil & Refining Co. and Abbott & Dillard's No. 1 Misco, SE cor. NW NW Section 18-14-10, is making 300 bbls. daily from Dutcher sand 2,854-55 feet. This is an exceptional Dutcher sand well for only 1 foot in the sand.

**Carter County**

Wirt Franklin Petroleum Corp. is building the rig for No. 1 Morris, NW cor. SE, Section 11-2s-3w. Roxana Petroleum Corp.'s No. 1 Carter, SE cor. SW SW, Section 14-1s-3w, has been completed for 320 bbls. in a series of sands 2,365 feet to 2,455 feet. Coline Oil Co.'s No. 6 Higgins, SE cor. SW NW, Section 6-2s-2w, has been abandoned at 4,139 feet. E. M. Boring and others' No. 1 Walker, SW cor. SE NW, Section 10-4s-2w, made 125 bbls. from sand 2,175-84 feet.

**Garvin County**

Magnolia Petroleum Co. has moved the rig material out for No. 28 S. H. Cowan, SE cor. SW NE, Section 15-1-3w.

**Grady County**

Carter Oil Co.'s No. 5 Dryden, CWL E half NE SW, Section 2-4-8w, cemented 8¼-inch casing at 2,059 feet, drilled to 2,350 feet and is making 42,000,000 feet of gas. Commerce Development Co.'s No. 1 Glover, SW cor. NE SW, Section 13-4-8w, has been shut in for 41,000,000 feet of gas at 2,365 feet. The Texas Company's No. 2 Glover, NE cor. SW NW, Section 13-4-8w, was completed for 17,000,000 feet of gas in sand 2,259-2,359 feet. Wirt Franklin Petroleum Corp. and others' No. 4 Woods, NW cor. SE NE, Section 17-3-5w, is swabbing 100 bbls. from sand 2,325-35 feet and 2,354-87 feet. Carter Oil Co.'s No. 5 Carter-Kerans, NW cor. NE SE, Section 21-3-5w, Carter Knox Pool, made 85 bbls. from sand 1,785-91 feet. No. 1 W. E. Polson, NW cor. NE SW, Section 27-3-5w, is swabbing 95 bbls. from sand 1,716-19 feet. Carter Oil Co.'s No. 2 Wham, SW cor. NW NE, Section 34-3-5w, has been abandoned at 1,497 feet.

**Hughes County**

Dixie Oil Co. and Phillips Petroleum Co. made location for No. 2 Perryman, SE cor. SW, Section 17-8-10.

**Okfuskee County**

Laurel Oil Co., Link Oil Co. and Irwin's No. 1 Self, SW cor. SE NE, Section 21-13-9, is dry and abandoned in Wilcox sand 3,898-3,905 feet. Shedron Oil Co. and others' No. 1 Jacobs, NE cor. NW NW, Section 22-12-11, made 24 bbls. from Wilcox sand 3,465-3,515 feet. Barnsdall Oil Co.'s No. 1 Carolina, CNL S half SW NE, Section 20-10-9, has been completed for 44,000,000 feet of gas in sand 3,290-3,309 feet.

**Jefferson County**

Amerada Petroleum Corp. made location for No. 1 Emerson, NW cor. SE SW, Section 28-5s-8w.

**McIntosh County**

J. Aggas' No. 5 Porter, SW cor., Section 3-12-14, has been completed for 500,000 feet of gas from sand 1,180-90 feet.

**Okmulgee County**

Anadarko Western Oil Co. has the rig built for No. 1-A Ross, NE cor. SE, Section 12-15-11.

J. H. Rebold Oil Co.'s No. 1 Brook, SW cor. NE, Section 6-15-13, had sand 2,085-95 feet from which it is making 30,000,000 feet of gas. Independent Oil & Gas Co.'s No. 1 Tucker, SW cor. SE NW, Section 9-15-14, is making 4,500,000 feet of gas from sand 1,821-35 feet. C. T. Smith's No. 10 Rentie, NE cor. SE SW, Section 18-14-15, made 6 bbls. from sand 1,225-36 feet. T. A. Johnson's No. 3 Skelton, CEL SW NE, Section 2-13-12, drilled to 2,781 feet in Wilcox and plugged back to the Taneha sand 1,726-34 feet for 1,500,000 feet of gas.

**Muskogee County**

P. Boyle and others moved a machine out for No. 2 Simmons, CWL SW NE, Section 10-15-15. J. O. Tilly's No. 1 Ackley, NE cor. SW NW SW, Section 34-15-19, is drilling at 180 feet.

P. Boyle's No. 4 Barnett, C NE SE, Section 8-15-15, made 180 bbls. from sand 1,613-14 feet. W. A. Peterson's No. 7, SW cor. SE SE, Section 18-14-17, is making 3,000,000 feet of gas from 530-43 feet.

**Pontotoc County**

Max Westheimer's No. 1 Milner, SE cor., Section 8-5-8, made 200 bbls. from sands 2,366 feet to 2,427 feet. Louisiana Oil Refining Corp.'s No. 7 Perry, SW cor. NW, Section 20-5-8, Allen Pool, has been completed for 200 bbls. in sands 2,853-65 feet and 2,853-65 feet.

**Pottawatomie County**

Independent Oil & Gas Co. and others made location for No. 3 Hamby, SE cor. NW NW, Section 14-7-4, Pearson Pool. Independent Oil & Gas Co. and Darby Petroleum Co. made location for No. 2 Wallace, NE cor. SW SW, Section 14-7-4. Independent Oil & Gas Co. staked location for No. 1 Saunders, NW cor. NE NE, Section 19-7-4.

Independent Oil & Gas Co. and Darby Petroleum Co.'s No. 3 Standridge, SE cor. NW SW, Section 14-7-4, Pearson Pool, topped the Hunton lime at 3,642 feet, drilled to 3,793 feet and flowed 335 bbls. Continental Oil Co.'s No. 1 Neghnguit, SE cor. NW, Section 19-7-4, had an initial production of 475 bbls. from Hunton lime 3,714-3,862 feet. C. J. Wrightsman's No. 1 Thompson, SE cor NE NW, Section 20-7-4, swabbed 30 bbls. from Hunton lime 3,816-4,110 feet and has been abandoned.

**Rogers County**

Lou Riggs' No. 1 Draper, CNL NW NE, Section 10-21-16, has been abandoned at 857 feet.

**Seminole County**

Fuhrman Petroleum Co. and others made location for No. 1 Davis, SW cor. SE, Section 3-10-6. Gypsy Oil Co. staked location for No. 6 Sango, SW cor. NW SE, Section 1-9-5, Earlsboro Pool. Magnolia Petroleum Co. has the rig on the ground for No. 6 Hammond, NE cor. SE NE, Section 10-8-6, Bowlegs Pool. Indian Territory Illuminating Oil Co. is erecting the rig for No. 3 Lizzie, NW

## WILDCAT OPERATIONS IN OKLAHOMA

**NORTHERN OKLAHOMA**

**GRANT COUNTY**

Otstot Development Co.s No. 1 Snyder, NE cor. NE Sec. 6-28-3w ..... Shut down 4,518 ft.

J. V. Bailey and others' No. 1 Maddox, C SE Sec. 18-27-5w ..... 2,000,000 ft. gas 4,835 ft., shut down 4,842 ft.

Thraves and others' No. 1 C. D. Fuss, SW cor. NW NW Sec. 30-27-4w ..... Shut down 1,230 ft.

Burns & Beasley's No. 1 Bolsterton, SW cor. NW SW Sec. 24-27-3w ..... Rig.

Brasil & Moses' No. 1 Goutier, SW cor. NW Sec. 34-26-4w ..... Shut down for pipe 650 ft.

Lambert and others' No. 1 Tabor, SE cor. NE SE Sec. 23-26-3w ..... Spudded and shut down.

Cowden and others' No. 2 Vollmer, CEL NE SW Sec. 22-25-4w ..... Fishing 5,640 ft.

**HARPER COUNTY**

Kopisch Oil Co.'s No. 1 Johnson, NE cor. SE Sec. 24-27-21w ..... Rigged up and shut down

Hoffer Oil's No. 1 Cooper, NW cor. SE SE Sec. 12-25-22w.. Shut down 4,182 ft.

**WOODS COUNTY**

Sooner State Oil Co.'s No. 1 Marcum, C SW Sec. 20-27-15w ..... Spudded and shut down.

Victor Oil Co.'s No. 1 Buskirk, SW cor. SE Sec. 10-26-15w ..... Hole full water 775-800 ft., shut down 900 ft.

(Continued on Page 165)

# Flashed Fuel Oil

which is a by-product of the Dubbs Cracking Process with Flashing System is now commanding a premium price

That's "some" fuel oil, besides the biggest yield of Knockless-Pullsmore Gasoline!

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

cor. SW NW, Section 11-8-6. Reiter-Foster Oil Co. has moved the rig out for No. 1 Bunyard, SE cor. NW SW, Section 14-7-6, Little River area.

Mid-Continent Petroleum Corp. is building the rig for No. 4 Fleet, NE cor. SE SE, Section 7-5-8. Louisiana Oil Refining Corp. made location for No. 3 Punluste, NW cor. SW SW, Section 8-5-8. The Texas Company made location for No. 1 Hyde, SW cor. NW SW, Section 8-5-8. Louisiana Oil Refining Corp. staked location for No. 4 Reed, SE cor. NW NE, Section 18-5-8, Allen Pool. W. R. Ramsey has the rig on the ground for No. 2 Culley, NE cor. SW NE, Section 18-5-8. The Prairie Oil & Gas Co. is moving in the rig for No. 1 Hudson, SW cor. SE SE, Section 12-7-6, Little River Pool.

Twin State Oil Co.'s No. 5 Barker, NW cor. NE NE, Section 12-9-5, Earlsboro Pool, had Wilcox sand 4,299-4,306 feet and plugged back to 4,296 feet where it swabbed 70 bbls. Carter Oil Co.'s No. 2 S. Davis, NE cor. SW NW, Section 13-9-5, made 685 bbls. from Wilcox sand 4,362-68 feet. Magnolia Petroleum Co.'s No. 4 Davis, NW cor. SW NE, Section 13-8-6, Bowlegs Pool, is dry and abandoned at 4,340 feet. No. 5 Davis, SW cor. NE, Section 13-8-6, swabbed 105 bbls. from Wilcox sand 4,195-4,210 feet. The Texas Company's No. 13 Reed, NE cor., Section 14-8-6, swabbed 240 bbls. from Wilcox sand 4,425-43 feet. Carter Oil Co.'s No. 3-A Bowlegs, SW cor. SE SW, Section 15-8-6, topped the Wilcox sand at 4,335 feet, drilled to 4,418 feet and plugged back to 4,373 feet where it swabbed 115 bbls. Indian Territory Illuminating Oil Co.'s No. 8-B Goforth, NE cor. NW NE, Section 15-8-6, made 279 bbls. from Wilcox sand 4,078-4,200 feet. Carter Oil Co.'s No. 7 Fish, NW cor. SW SW, Section 36-8-6, Little River Pool, was completed for 630 bbls. in Wilcox sand 4,234-38 feet. Indian Territory Illuminating Oil Co.'s No. 4 Phoebe "B", NW cor. NE SW, Section 36-8-6, produced 172 bbls. from Wilcox sand 4,880-82 feet. Sinclair Oil & Gas Co.'s No. 2 Cosar, SE cor. NW NW, Section 36-8-6, made 980 bbls. from Wilcox sand 4,298-4,307 feet. Jarvis & Holm's No. 1 Street, NW cor. SE NW, Section 21-7-8, topped Wilcox sand at 4,352 feet, drilled to 4,362 feet then plugged back to 3,150 feet and made 115 bbls.

**Stephens County**

Amerada Petroleum Corp.'s No. 1 Hanson, NE cor. SE SW, Section 12-1-4w, is rigging up to deepen from 2,509 feet. Pearce & Brown moved rig timbers to the location for No. 8 Wilkinson, SW cor. SE, Section 27-1s-8w. Schermerhorn Oil Co. and others' rig is being built and tools moved in for No. 1 Russell, NE cor. NW SE, Section 11-1s-4w. Beard & Cobb made location for No. 3 Wade, NW cor. SW NE, Section 11-2s-8w.

Snodgrass and others' No. 1 Nigh, NE cor. NW, Section 34-1s-8w, has been completed for 250 bbls. in sand 1,680-89 feet. Skelly Oil Co.'s No. 4 Krebbs, NW cor. SW SE, Section 13-1s-4w, made 765 bbls. from a series of sands 2,289 feet to 3,200 feet, total depth 3,282 feet. George Pace and others' No. 1 Allen, CNL NW NE, Section 3-2s-8w, has been abandoned at 2,434 feet.

**Creek County**

J. B. Grieves' No. 7 Porter, CWL NW SE, Section 12-19-8, is drilling at 300 feet. Roxana Petroleum Corp. has the rig up for No. 3 Clark, SE cor. NE NW, Section 18-19-9. J. A. Hull Co. has moved the rig out for No. 3 M. Walker, SE cor. SW SW, Section 21-18-9. Tidal Oil Co. has built the rig for No. 1 Roberts, NW cor. SE, Section 20-17-7. Thompson & Black's No. 3 Broadnax, NW cor. SE NW, Section 16-17-11, is spudding. W. G. Banks' No. 2 Crider, CSL SE NW, Section 31-17-12, is spudding.

Hayden and others' No. 1 Futrell, NE cor. SE SE, Section 1-19-9, has been completed for 45 bbls. in Red Fork sand 2,058-78 feet. Roxana Petroleum Corp.'s No. 4 Sewell, NE cor. NW NE, Section 18-19-9, had Wilcox sand 2,865-71 feet and flowed 817 bbls. Pure Oil Co.'s No. 12 Crow, CNL SE SE, Section 26-18-12, drilled Turkey Mountain sand 2,173-98 feet and has been abandoned. Transcontinental Oil Co.'s No. 4 Freeman, SW cor. SE SW, Section 14-17-8, is dry and abandoned at 2,792 feet. H. C. Wilson's No. 1 Secrest, SW cor. SE, Section 36-16-10, made 20 bbls. from Dutcher sand 2,704-16 feet. Wilcox Oil & Gas Co.'s No. 1 Kimble & Reading, SE cor. NW, Section 18-14-10, topped Wilcox sand at 3,404 feet, drilled to 3,426 feet and after plugging back 6 feet made 46 bbls. Independent Oil & Gas Co.'s No. 9 Wolfe, SW cor. NW NE, Section 18-14-10, produced 305 bbls. from Wilcox sand 3,420-33 feet.

**Garfield County**

Sinclair Oil & Gas Co.'s No. 19 Hartley, SW cor. NW, Section 18-22-3w, Garber Pool, is dry after deepening to 5,958 feet in granite and will be abandoned.

**Kay County**

Black Gold Oil Co.'s No. 3 Moore, NE cor. NW NW, Section 10-27-1w, Blackwell Field, an old well being deepened from 3,437 feet, is now underreaming 6-inch casing at 3,560 feet. P. S. Wheeler has a machine at the location for No. 1 Wheeler, SE cor. SW SW, Section 14-27-1w.

Royal Oil & Gas Co.'s No. 1 Fulton, C SE NE, Section 12-28-1w, has been completed for 500,000 feet of gas in sand 760-68 feet. Industrial Oil & Gas Co.'s No. 1 Walker, C NE NE, Section 2-27-1w, gauged 1,500,000 feet of gas from sand 755-61 feet. Dewey & Hoeffer's No. 1 Fox, SE cor. SW, Section 5-27-1w, was drilled to 3,512 feet and abandoned. Rogers and others' No. 1 Ellidge, C NE SE, Section 32-27-1w, is making 3,400,000 feet of gas from sand 749-61 feet. Royal Oil & Gas Co.'s No. 1 Brazelton, C NW SW, Section 5-27-1, has been shut in for 175,000 feet of gas from sand 821-58 feet.

**Osage County**

Phillips Petroleum Co. made location for No. 8, SE cor. NW SE, Section 17-27-6. Location was also made for No. 9, NE cor. SW SE, Section 17-27-6, Burbank Pool. Peters Petroleum Co.'s No. 3 CNL S half NW, Section 26-25-9, is rigging up.

Kewanee Oil & Gas Co.'s No. 3, SE cor. SW NE, Section 28-27-6, Burbank Pool, had Burbank sand 2,894 feet, total depth 2,952 feet and made 100 bbls. in 14 hours. No. 7, NE cor. NW NE, Section 28-27-6, found Burbank sand from 2,920 feet to 2,995 feet, drilled to 3,008 feet and made 1,476 bbls. natural. Lew's Production Co.'s No. 3, NW cor. SW SW, Section 2-26-6, was completed for 1,200 bbls. in Burbank sand 2,845-2,926 feet. No. 4, SW cor., Section 2-26-6, made 800 bbls. natural from Burbank sand 2,836-2,901 feet. Carter Oil Co.'s No. 5, NE cor. SE SE, Section 3-26-6, was completed for 1,080 bbls. in Burbank sand 2,839-2,902 feet. Kay County Gas Co.'s No. 1, SE cor. SW, Section 4-25-6, is dry and abandoned at 3,349 feet. Peters Petroleum Co.'s No. 2, NE cor. SW, Section 32-24-9, was shot with 80 quarts in Cleveland sand 1,476-1,573 feet and made 15 bbls. Delmar Oil Co.'s No. 4, NE cor. SW SE, Section 17-23-10, had Wilcox sand 2,514-16 feet and made 17 bbls. after the shot. The Prairie Oil & Gas Co.'s No. 1, SW cor. NW NW, Section 21-27-6, Burbank Pool, made 1,050 bbls. natural from sand 2,874-2,963 feet.

**Pawnee County**

Watchorn Oil & Gas Co.'s No. 1 Arkeketa, NE cor. SW SE, Section 9-22-3, drilled to 4,607 feet and has been abandoned after plugging back to 3,160 feet. Turner and others' No. 1 Hallett Townsite, SE cor. SW NE, Section 8-20-7, is pumping 10 bbls. from sand 2,641-75 feet. Black and others' No. 4 Cotton, CWL SW NE, Section 6-20-8, was completed for 2,500,000 feet of gas in sand 2,003-24 feet. J. H. Turner and Pax Oil Co.'s No. 2 Weeks, NE cor. SE, Section 30-29-9, is a 5-bbl. well in Layton sand 1,105-9 feet. Sheridan Oil Co.'s No. 1 Ward, NE cor. SE NW, Section 20-20-10, is a 2,000,000-foot gas well in Burgess sand 2,196-2,210 feet.

**Tulsa County**

Superior Oil Corp. has a machine on the ground for No. 10, SW cor., Section 6-19-10. No. 9 McKee, SW cor. NW SW SW, Section 6-19-10, made 151 bbls. from Red Fork sand 2,018-2,049 feet.

**Wagoner County**

O. A. Sewell and others' No. 2 McIntosh, CEL SE NE, Section 18-17-16, is cleaning out at 1,015 feet to deepen. C. R. Crane and others moved a machine to the location for No. 2 Williams, SE cor. NW SE, Section 35-17-17.

R. F. Garland Co.'s No. 2 Thomas, CNL NW SE, Section 14-19-16, has been abandoned at 523 feet. No. 3 Thomas, SW cor. NW NW SE, Section 14-19-16, is dry and abandoned at 449 feet. William McDougal's No. 1 Dan, SE cor. NW NW, Section 21-17-15, was completed for 75 bbls. in sand 1,907-12 feet. Wilson & Tillman's No. 2 E. Butler, C SE SE, Section 33-16-17, is dry and abandoned at 1,834 feet.

Production of the Greater Seminole

(Continued on Page 202)

# LOST SPRINGS POOL EXTENDED; COWLEY COUNTY WELL DEEPENED

By J. L. Dwyer
*Staff Correspondent, Kansas Fields*

A well which extends the Lost Springs Pool to the southeast, and which is believed to be the highest well in the field structurally, and an old well drilled deeper in Cowley County were the best bits of news garnered in Kansas last week.

The Lost Springs well is Lariaux and others' No. 1 Johnson, SW cor. NE NW Section 23-17-4, and it had the sand 2,328-71 feet, and made 20 bbls. hourly on the swab. This well has caused much interest in the region southeast of the limits of the field, and numerous leasing activities were reported under way. There are now about 20 drilling wells in this field.

In Cowley County, the Independent Oil & Gas Co.'s No. 1 Swenson, SE cor. NW NW Section 15-23-4, an old well drilled deeper, is spraying about 20 bbls. daily from sand 2,986-93 feet, and also making 2,000,000 feet of gas.

**Butler County**

Marland Oil Co. and Phillips Petroleum Co. made location for No. 1 Stephenson, NE cor. SE, Section 35-23-3. Fleming and others made location for No. 1 Brainerd, NE cor. NW, Section 22-24-3. Federal Oil Co.'s No. 12 Drum-Bitler, CNL NE, Section 31-26-8, is drilling at 400 feet. Shawver and others' rig is up for No. 1 Nelson, NE cor. SE, Section 8-29-8. Blankenship Petroleum Co.'s No. 1 Pyle, SW cor. NE, Section 22-26-4, is dry and abandoned at 3,438 feet. Rosenthal and others' No. 9 Shaffer, SW cor. SE SE, Section 4-27-6, has been completed for 150 bbls. in sand at 3,133-41 feet.

**Cowley County**

Herron and others' No. 1 Marshall, SW cor. NE, Section 36-30-6, is drilling at 1,235 feet. The Prairie Oil & Gas Co. made location for No. 1 Magnuson, NW cor. NE NW, Section 14-30-4. Lewis Production Co. made location for No. 1 Pearce, SE cor. SW SE, Section 30-31-6. Pryor & Lockhart and others moved the rig out for No. 2-A Drury, NW cor. NE NE, Section 31-31-6. Independent Oil & Gas Co. and others' No. 1 Swenson, SW cor. NW SW SE, Section 15-32-4, is rigging. Mission Oil Co. has the rig on the ground for No. 1 Evans, Lot 9, Block 42, Section 22-32-4. McNabb and others' No. 2 Wallace, Lot 5, Section 22-32-4, is drilling at 2,390 feet. No. 1 Mattison, Lot 5, Block 44, Section 22-32-4, an old well, is rigging up to deepen. Barnsdall Oil Co. has the rig on the ground for No. 1 Russell, SE cor. NE NW SE, Section 15-33-4.

Derby Oil Co.'s No. 1 Seaman, NE cor. SE NE, Section 32-30-3, is dry and abandoned at 2,204 feet. Boggs Drilling Co.'s No. 1 Henderson, C NE NW, Section 5-33-5, has been shut in for 160,000 feet of gas from sand at 627-35 feet. Neeley Oil & Gas Co.'s No. 1 Bell, C NW NE, Section 5-33-5, was deepened to 3,180 feet and abandoned. Engran & Wilson's No. 1 Victory, C SW SE, Section 7-33-3, is a dry hole at 785 feet.

**Dickinson County**

Johnson and others staked location for No. 1 Schlessner, C SW NE, Section 18-16-4. Staats and others made location for No. 1 Smith, NE cor. SE SW, Section 23-16-4.

**Geary County**

Pioneer Petroleum Co. has the rig at the location for No. 1 Chase, SE cor. Section 10-12-7.

**Greenwood County**

Empire Oil & Refining Co. is erecting the rig for No. 10 Schwab, NE cor. SE, Section 25-22-12. Darby Petroleum Co. has built the rig for No. 9 Schwab, SE cor. NW, Section 30-22-13. Empire Oil & Refining Co. is building the rig for No. 1 Schwab "B," NW cor. SW, Section 30-22-13. The rig is also being built for No. 2 Schwab "B," NE cor. NW

(Continued on Page 202)

## KANSAS WILDCATS

**BARBER COUNTY**

**G. W. Basom's No. 1 Grant**, SW cor. SE SW, Sec. 14-31-3 ..... Spudded.
**Otstot et als' No. 1 Barlow**, SE cor. SE, Sec. 22-33-3w ..... Shut down 1,860 ft.
**Rolland and others' No. 1 Pickens**, NE cor. NW NE Sec. 27-30-14w ..... Shut down 3,196 ft.
**J. K. D. Shaffer's No. 1 Carter**, C SE SE Sec. 2-33-13w ..... Drilling 3,980 ft.
**J. K. D. Shaffer's No. 1 Boggs**, SW cor. NE SW Sec. 9-33-13w ..... Drilling 4,752 ft.
**Skelly Oil Co. and others' No. 1 Winter**, CE half Sec. 17-31-12w ..... Fishing 3,445 ft.

**BARTON COUNTY**

**Everett & Wiley's No. 1 Ward**, NW cor. SW Sec. 12-20-13w ..... Shut down 3,948 ft.
**Huffine and others' No. 1 Smith**, NE cor. SE NW Sec. 17-19-11w ..... Shut down 5,180 ft.

**BUTLER COUNTY**

**Cress & Franks' No. 1 Bryson**, NE cor. NE Sec. 26-27-5 ..... Drilling 525 ft.
**Empire Gas & Fuel Co.'s No. 1 Semisch**, NW cor. SE NW Sec. 4-28-7 ..... Drilling 1,502 ft.
**La Robb and others' No. 1 Bronsenger**, NE cor. SW Sec. 24-27-3 ..... Rig.
**Joe Liggett's No. 1 Travender**, NW cor. SE Sec. 24-28-6 ..... Drilling 2,530 ft.
**White Eagle Oil & Refining Co.'s No. 1 Dixon**, NE cor. SE SW Sec. 1-27-6 ..... Hole full of water 3,099-3,105 ft.; shut down.
**H. F. Wilcox Oil & Gas Co.'s No. 1 Littell**, NE cor. SE NW Sec. 21-29-4 ..... Collapsed casing 1,458 ft.; shut down.

**CHASE COUNTY**

**Griener & Fowler's No. 1 Carson**, NE cor. NE Sec. 9-21-7 ..... Drilling 1,700 ft.

**CLARK COUNTY**

**Skelly Oil Co. & Merriam's No. 1 Winter**, C E Half Sec. 17-31-12w ..... Drilling 3,465 ft.
**Walter & Warner's No. 1 Mitchell**, SW cor. NE Sec. 16-31-23w ..... Shut down 600 ft.

**CLOUD COUNTY**

**Concordia Producing & Refining Co.'s No. 1 Murdock**, SE cor. SE Sec. 6-6-4w ..... Shut down 3,590 ft.

**COWLEY COUNTY**

**Allison & Fitzwilliams' No. 1 Shapland**, NE cor. NW SE Sec. 20-30-6 ..... Shut down 790 ft.

(Continued on Page 161)

# TRANSIT PUMPS

**F**igure No. 1700 is a very popular type in the smaller refineries.

Fig. No. 1700

**O**ur name TRANSIT, is a guarantee now just as it has always been for the past forty years.

Fig. No. 1791

**R**eal, honest-to-goodness, forged steel cylinders on all types.

Fig. No. 1733

**H**eavy, cast iron, flanged steam cylinder piping and real brass globe valves.

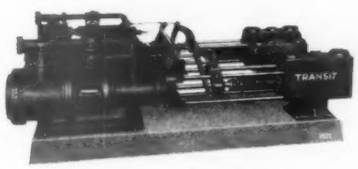

Fig. No. 1571

**O**il in exact quantities is delivered per minute, per hour and per day by TRANSIT Hot Oil PUMPS.

Fig. No. 1805

**T**he discharge from any of these pumps is steady and constant.

Fig. No. 1792

**O**ur hot oil pumps are absolutely safe in operation, both to life and property.

Fig. No. 1725

**I**llustrated descriptive matter on any type or Fig. No. furnished promptly.

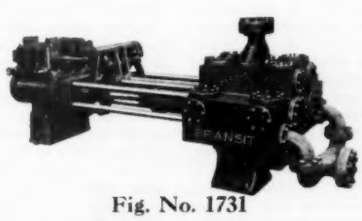

Fig. No. 1731

**L**ong stroke pumps are long lived.

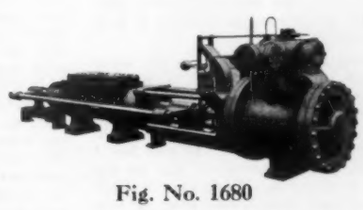

Fig. No. 1680

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# Shooting Successful in the Dale Field

## Caldwell County Well Now Making Heads and Flowing Considerable Oil. White Point Gasser Reignites

By B. D. Stevenson
*Staff Correspondent, Southwest Texas Fields*

SAN ANTONIO, Tex., Feb. 27.—Saxet Oil Co.'s No. 7 Rachal, in the White Point gas field in San Patricio County, is on fire again. The well after putting gas into the Houston Gulf Gas Co. line for six months developed a split casing January 16 and cratered 30 feet from the well. January 19 it caught fire and burned until February 6 when Tex Thornton put it out. Since then it had seemingly been choking itself off and heads that it made were getting weaker. Last week after not making a head for 30 minutes it suddenly blew in and cleaned the hole of everything, including a lot of tubing, and caught fire again and burned steadily. Efforts are gain being made to put out the fire. The Houston Oil Co. well 300 feet away dropped from 700 pounds rock pressure (working pressure) to about 630 pounds but later built back up to 650 pounds and has been hanging at that.

In the proven fields completions are of no particular significance for the past week. Some of those reported this week in the Refugio and White Point Fields were completed prior to last week but reports were delayed. They are all in proven territory.

One of the features of the week was the shooting of the Sun Oil Co.'s No. 2 Talley in the Dale Field in Caldwell County in the W. C. Swearingen Survey. It is 150 feet from the northwest and southwest lines of the Tally tract and total depth was 2,185 feet. It was completed a very small well a few months ago. When The Texas Company, offsetting it to the northwest, got a little better well the Sun company shot No. 2 Tally with dynamite and the next morning it was standing 400 feet off the top in oil and later the second day was making heads and flowing considerable oil. This is the first well shot in the field and the success will probably lead to the shooting of other wells. There were several drilled that found the Serpentine formation tight and unyielding and with the likelihood that a shot might make them productive.

**Cartwright Field**

In the Cartwright Field in Live Oak County the Houston Oil Co. has, after some delay, completed No. 2 Brown Land & Cattle Co., which is the third well on the east side of the Nueces River to produce. All of the rest of the field is west of the river.

A disappointment was registered when Livingston in the Aviator Field area in the Mirando Field in Webb County tested salt water at 1,748 feet in Section 5 of the Edgington Subdivision of the Puig Brothers ranch. It was No. 1 Puig. It is in a territory just to the west of production. Last year a little producing spot was found west of Livingston and there has been a theory that the Livingston location ought to produce oil. The test seems to settle the controversy.

Humble company's third well on the Kohler ranch in Duval County, 10 miles north of the Cole gas field, is waiting to test with casing set 100 feet deeper than in No. 4 and No. 6, the two producers completed on the tract just north of it. Sand in the new well is at 2,793-2,807 feet. No 7, located 300 feet south of No. 6, failed to pick up the producing sand of No. 6 and No. 4.

**COMPLETIONS**

**Caldwell County**

Magnolia Petroleum Co.'s No. 11 W. J. Tiller, John Henry Survey, Luling Field, at 2,127 feet is 35-bbl. well.

Brandt and others' No. 1 R. W. Boyd (formerly Doctor Butte and others) J. R. Miller Survey, has been abandoned dry at 2,360 feet.

**Live Oak County**

Houston Oil Co.'s No. 2 Brown Land & Cattle Co., in the Lucas gas field, has been completed an average gasser for the field.

**Refugio County**

Houston Gulf Gas Co.'s No. 5 Fanny Heard, in the Refugio gas field, at 3,305 feet has been completed for 40,000,000 feet dry gas.

Houston Oil Co.'s No 8 W. J. J. Heard in the same field, at 3,256-66 feet, has been completed for 40,000,000 feet of dry gas and the company's No. 4 Rooke at 2,851-58 feet has been completed gauging 30,000,000 feet of dry gas.

Houston Gulf Gas Co. has abandoned locations of No. 1 and No. 2 A. W. Heard and also abandoned No 3 A. W. Heard temporarily at 400 feet and No. 4 A. W. Heard temporarily at 2,510 feet. The same company abandoned No. 1 Wilson Heard at 1,920 feet and moved off rig, but may come back and deepen later.

Houston Oil Co.'s No 2-A Rooke abandoned at 2,600 feet will be deepened later and the company's No. 1 Smith Heard has been abandoned due to trouble found in setting casing.

**Lee County**

Allen Creek Oil Co.'s No. 1 Henderson in the William Mock Survey, in the vicinity of Hicks, has been abandoned at 1,600 feet due to drill stem twisting off, and the understanding is that the derrick will be skidded 50 feet north and another well started. This well has been the "unlucky well" due to various mechanical troubles it has had since it was spudded in.

**Bee County**

Red Ant Oil & Gas Co.'s No. 1 Perry & Chesnut in the B. Q. Hadley Survey, 6½ miles west of Pettus, has been temporarily abandoned at 1,000 feet.

**San Patricio County**

Ed R. Herwick's No. 1 Tsemelis, a wildcat test in San Patricio County, has been abandoned.

**New Locations**

Magnolia Petroleum Co. is moving back in Survey 53 of the Schott Field in Webb County to deepen No. 1 Garcia from 1,580 feet.

Schott-Taffel's No. 1 A. M. Bruni, located 3,000 feet southwest of the northwest corner in Survey 585, is moving on. This test is south of the O'Hern & Seacord wells and in the same survey as the gasser recently completed by O. W. Killam.

Hill, Reiser & Weed's No. 1 H. Rodriguez is location in Block 1 of the R. V. Hill Subdivision in Zapata County.

Humble Oil & Refining Co.'s No. 7 Walsh in Survey 165 of the Piedras Pintas Dome in Duval, reported last week as abandoned at 4,505 feet, is to be deepened and is fishing for bailer at the depth given.

Devil's River Oil Co. is moving in rig for a 2,000-foot test in the center of the east half of Section 164, C.C.S.D.&R.G.N. G. Survey in Edwards County.

Tom Callahan and associates have let contract for No. 1 National Cattle Loan Co. in NW Section 47, Block Y, in Val Verde County, 9 miles west and 4 miles south of the O. O. Owens No. 1 Mills.

R. H Seefeld and others' No. 1 in Jim Wells County, located 6 miles northwest of Alice, has derrick up and is moving in rig.

J. M. Rentz' No. 1 J. Siligman & F. Freeman in the Gustavus Chotwell Survey, 6 miles west of Prairie Lea in Guadalupe County, has spudded in and set surface casing.

C. L. LeCompte's No. 2 Diaz, Survey 32, Block 4,283, in Bexar County, is location 460 feet north of No. 1.

Magnolia Petroleum Co.'s No. 8 F. M Mercer in the Luling Field in Caldwell County is rigged up.

Saxet Oil Co's No. 2 Weil in the Saxet gas field in Nueces County is rigging up and is west offset to No. 1 Perry & Reid.

Saxet Oil Co.'s No. 1 Dennett is building derrick in San Patricio County and is 1,686 feet due north of the Houston Oil-Sun company No. 2 Steele.

**Cole Gas Field—Duval**

Houston Oil Co.'s (Humble) No. 2 Juan V. Cuellar, Share 1, Cuellar Grant, located 475 feet to southwest lines and 2,258 feet to northwest lines (location changed), has derrick up. Houston Oil Co.'s (Sun) No. B-4 Benavides, Survey 12, Block 13, located 660 feet to north and east lines, has been spudded in.

**Humble-Reiter-Foster**

Humble Oil & Refining Co.'s No. 7 Kohler, Survey 165, located 200 feet to north and west lines, is in sand at 2,793-2,807 feet and setting casing to test.

**Driscoll Field**

Robert Driscoll's No. 9 fee, Survey 23, located 1,875 feet to west line and 2,850 feet to south line, set casing at 2,989 feet and will be ready to bring in within a few days. On test the well showed around 50,000,000 feet of gas and when it was pulled the hole filled 250 feet with oil.

**Randado Field—Jim Hogg**

Johnson and others' No. 24 Palacious, Survey 291, Block 14, is location 150 feet to east line and 726 feet to north line. Magnolia Petroleum Co.'s No. 35 Merchants State Bank, Survey 415, located 1,525 feet to west line and 2,275 feet to north line, is moving on.

**Henne, Winch & Farris Field**

Edward St. Albans' No. 9 Lopez, Share 1, Block 6, located 291 feet to east line and 180 feet to south line, is standing at 2,144 feet.

**Alworth Field**

Alworth-Stevens-Hild's No. 11 M. Garza, Survey 39, Block 10, is location 215 feet to northwest lines and 518 feet to southwest lines (location changed).

**Reiser Field—Webb**

W. O. Wheatley's No. 3 Wheatley, Survey 1,618, Block 12, located 850 feet to south line and 450 feet to west line, is in sand at 334 feet and testing.

**Leaseholders Pool**

J. H. Winch's No. 1 A. E. Gates, Survey 70, located 1,470 feet to south line and 1,170 feet to west line, is drilling at 2,120 feet.

**Aviator or Bruni Tracts**

Livingston and others' No. 1 Puig, Block 5, Edgington subdivision, located 150 feet to north and west lines, is drilling at 1,400 feet.

**Carolina-Texas Field**

Houston Oil Co.'s No. 3 S. Benavides, Survey 683, located 350 feet to north line and 1,470 feet to east line, is standing at 3,014 feet ready to spud in, waiting orders to deepen.

**Cole Gas Field No. 2**

Cole Petroleum Co.'s No. 52 Benavides, Survey 412, Block 5, located 123 feet to north line and 482 feet to west line, at 2,323 feet test showed gas and valve

(Continued on Page 196)

## NEW TEST IN DIMMIT COUNTY NEAR MAVERICK COUNTY LINE

By B. D. Stevenson

SAN ANTONIO, Tex., Feb. 27.—Humble Oil & Refining Co. which last week got a little gas and water in No. 1 City National Bank in Dimmit County, near the Maverick County line, will abandon that hole but will drill another well. No. 1 City National Bank is in Survey No. 654 and located 700 feet from the north line and 2,000 feet from the east line and was drilled to 5,004 feet. It picked up some minor showings when it was drilled and some were tested out. On abandoning it at 5,004 feet after it had bailed dry, the casing was shot at 2,600 feet with dynamite and bailed dry and again at 1,455-85 feet where it came in for 2,000,000 or more feet of gas and 500 bbls. of salt water, with no way of telling where the salt water is coming from. The rock pressure was 410 pounds. That well has been abandoned and the rig will be moved a short distance and another hole started to test out the sand. Humble has a big block of acreage and structural conditions seem to have been proven.

Driscoll's No. 9 fee in Duval County on Survey 23, halfway between the Cole Field and Piedras Pintas salt dome, is waiting to make a test. Casing has been set using 4½-inch casing. The well passed the sand depth of the discovery well, No. 8, at 2,449-69 feet without finding the sand that made a big gas well in No. 8. But at 3,005 feet, 18 feet into a sand, it blew in for a gas well estimated to be a big well. It started making sand and the valve was closed and caught in the drill stem 250 feet of oil. The supposition is that if it had been allowed to blow a little longer it would have come in an oil well. Casing has since been set and the well should be ready to test by at least the first of this week. The discovery gas well was brought in late last year. No. 10-A is a few hundred feet to the northwest and is a gas well at slightly greater depth, and No. 9, several hundred feet northeast of No. 8, threatens to be an oil well at 500 feet greater depth. Driscoll, it is said, refused an offer of $900,000 for a lease on his 50,000 acres the day before No. 9 tested salt water at approximately the same depth at which No. 8 is producing gas. He had previously been reported to have turned down offers of $250,000 and $500,000.

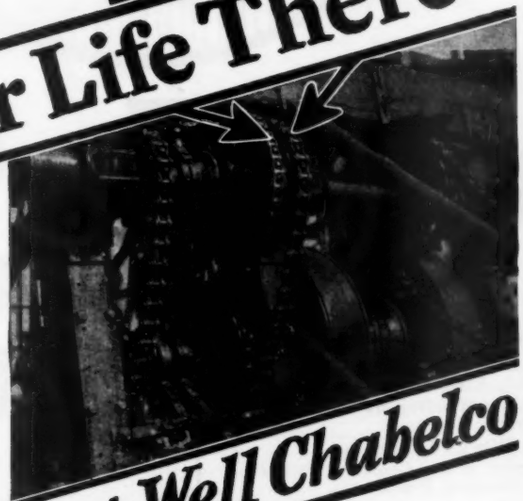
Another feature in wildcat territory is the Cole Petroleum Co.'s Nos. 51 and 52 Benavides in Survey 412, 4 miles west of the Cole gas field in Webb County. Last week No. 51 was reported gauging 115 bbls. of oil into storage through a small choke and making quite a little gas. It has since increased to over 160 bbls. of oil at a depth of 2,324 feet. No. 52, located 800 feet east and north of No. 51, on a test came in gas and when the valve was closed it caught several feet of good oil, uncut and showing no water. Casing has been set and it is about ready to bring in. These wells as explained last week are about a half mile north of where Cole Petroleum Co. first drilled some months ago and got considerable gas and some oil at approximately the same depth. It is quite possible for this spot to develop into an important oil field.

The Humble Oil & Refining Co. will

(Continued on Page 196)

# The Close Fits Here

# Mean Longer Life There



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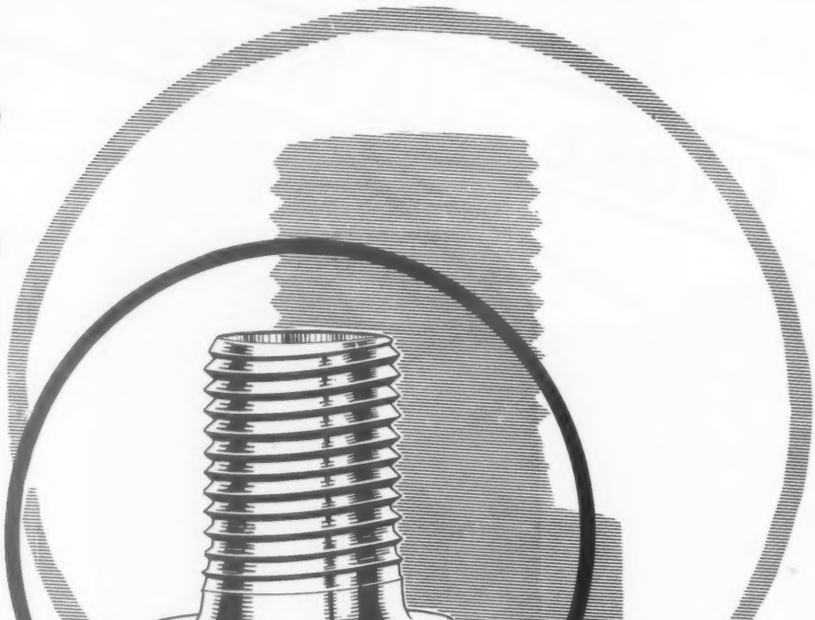

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# Possible Extension of Champagnolle

## That Area and Caddo District Have Week's Best Wells. Carterville Has Promise of Producer

By D. H. Bancroft
*Staff Correspondent, Louisiana-Arkansas.*

SHREVEPORT, La., Feb. 27.—In the way of completions Champagnolle, Cartersville and Caddo had the field, Champagnolle and Caddo each getting a 200-bbl. producer and Cartersville having two big gas wells and the promise of a producer. There were 25 completions in all divisions of the territory, five of them making 470 bbls., 9 being gassers with 184,357,290 feet initial flow and 11 failures.

Palmer Corp.'s No. 1 Roberson in Section 26-23-12, Cartersville, is still an unknown quantity. Since it made its first showing for a 2,000-bbl. well at 3,068 feet, it has been flowing for a few hours and sanding up, to repeat the performance every time it was cleaned out. Friday, after setting liner, it flowed 10 hours at 700 bbls. per day, 75 per cent water, whereas when it first started a week ago its 2,000 bbls. was 90 per cent oil.

About 2 miles south of it, in the southeast corner of proven territory, The Texas Company and Bahan & Davis got two of the best gassers completed in some time, the former's No. 1 Peyton, Section 30-23-11, estimated at 40,000,000 feet from 2 feet of sand, total depth 3,076 feet, and the latter's No. 1 Holmes, Section 36-23-12, being the same size from 4 feet of sand, total depth 3,078 feet. So far, a week after completion, neither has shown any water.

Caddo's 200-bbl. well was completed by Simplex Oil Co.'s No. 2 Baird in Section 22-20-15, total depth 2,225 feet. Location is on the "hickey" opened a year ago by Victor Wenzel and the vacant territory just south of Pine Island was shortly the scene of quite a bit of productive activity. In Section 26-20-15, Superior Oil Co.'s No. 8 Youree, which has been waiting on rig since December 21, was put on the beam for 5 bbls., total depth 2,318 feet. In Pine Island proper The Texas Company abandoned No. 47 Caddo Mineral Lands, Section 23-21-15, which has been temporarily abandoned at 3,657 feet since October. Location is just south of 3,900-foot production in Section 14 which was extended south just over the line by two recent small pumpers. Standard Oil Co. abandoned No. 12 A. L. Barry, Section 11-20-16, in the Oil City district, as a dry hole at 1,785 feet and put No. 18 J. J. Hart, Section 34-21-16, on the pump making 50 bbls. from 1,836 feet.

### Champagnolle Extended

The damper put on Champagnolle by not altogether satisfactory results of drill stem tests and bailing during the past two weeks, was relieved to a considerable extent when Magna Production Co.'s No. 1 Rowland in Section 14-17-14, was completed flowing 200 bbls. of clean 32 gravity oil by heads and a little gas, total depth 2,999 feet in 4 feet of sand. Apparently it is from the same sand as the producers in Section 1 and 2 but a little higher, in which case it means an extension of about a mile south and southeast. On the other hand, E. M. Jones' deep test, No. 3 Crain, Section 2-17-14, which was a salt water hole at 3,076 feet, has been abandoned as a duster at 4,014 feet without having anything that looked like production in between. Murdock and others' No. 1 Gregory, originally Garrett-Dodisett Drilling Co.'s No. 1 Gregory, Section 10-17-14, after sanding up at frequent intervals since completion January 4 flowing and pumping 500 bbls. fluid, 50 bbls. oil, from 2,765 feet, is reported having settled down to a steady flow of 200 bbls. of heavy oil, about 21 gravity. Pure Oil Co.'s No. 1 Gregory, Section 10-17-14, developed an oil show on test in sand at 2,788-90 feet and Simmerall and others' No. 1 Finley, Section 12-17-14, is drilling red beds at 2,980 feet.

E. M. Jones is moving in on location for No. 1 Stegall in the SE cor., Section 22-17-14, about 2 miles south of production, and Simon and others have location for No. 1 Jerry in NE cor. SE SW, Section 21-17-14.

### Good Well in Elm Grove

One of the best completions in the old Elm Grove district of Bossier Parish in several months was registered by Palmer Corp. in deepening No. 10 Caplis, Section 25-16-12. Completed May 10, 1926, pumping 60 bbls. of oil from 1,553 feet, it was deepened to 1,894 feet and finished as a gasser making a little over 6,000,000 feet.

Two gassers and one failure were completed in the Ouachita Parish, section of the Monroe gas field. Coco Bend Oil Co. abandoned No. 1 Cordell, Section 23-15-3, as a dry hole at 2,712 feet, having taken it over from Culver and others some time ago after they had abandoned it at 1,360 feet. Moody & Seagraves' second well in the Monroe Field, No. 1 United States Government, Section 1-19-3, was completed February 18 with an estimated 8,000,000 feet of gas at 2,177 feet and Ouachita Natural Gas Co.'s No. 8 Smith, Section 37-19-4, gauged 19,080,000 feet, total depth 2,100 feet.

In Richland Parish Natural Gas & Fuel Corp. is centering its activities on the two relief wells offsetting their No. 1-A Thompson crater in Section 21-16-6. No. 3-A Thompson is drilling at around 700 feet after safely passing through a sand at 206 feet which caused No. 2-A Thompson, the other relief well, to blow out with gas seeping from the crater and fresh water. The latter skidded derrick and has begun a new hole. The crater is still blowing 30,000,000 to 40,000,000 feet of gas with a more violent eruption at intervals of three to five minutes but conservation department officials report tests of other wells in the field have not shown any appreciable reduction in volume or pressure that can be attributed to the wild well.

Ruston Drilling Co. completed No. 1 Sartor, Section 17-16-6, 1¼ miles west of the crater, gauging 55,477,290 feet of gas, approximately the crater well's initial production, total depth 2,440 feet. Palmer Corp. has abandoned No. 2 Wayne Land & Timber Co., in Section 23-16-5, after plugging back from 2,525 to 2,475 feet and testing dry. As a Gulf Refining Co. test it had made a show of 250,000 feet of gas at around 2,460 feet and was turned over to the Palmer Corp. pursuant to terms of sale of the gas rights of the Gulf's Richland acreage.

In Webster Parish, Shongaloo district, Magnolia Petroleum Co. tested 3,000,000 feet of gas, total depth 2,696 feet, in No. 1 J. L. Munn, Section 36-23-10, but is going deeper a few feet. This level is rather high for wells in this area. The company's No. 1 H. L. Munn, Section 29-23-9, was completed as a 9,000,000-foot gasser, 390 pounds rock pressure, total depth 2,704 feet.

### Smackover Completion

Smackover territory in Union County, Arkansas, had three completions: Laurel Oil & Gas Co. tested salt water at 2,725 feet in No. 1 Houston, Section 12-16-16, and abandoned the hole. It had been completed June 25, 1925, as a 100-bbl. producer in the Graves sand at 2,623 feet. Lion Oil Refining Co.'s No. 1 Leverett, Section 11-16-16, was abandoned at 2,770 feet after testing salt water, and No. 7-D Murphy in Section 8-16-15 is pumping 100 bbls. fluid, 85 per cent water, total depth 2,658 feet.

Harrison and Panola Counties, Texas, each had two completions. In the former, Cox and others completed a Waskom failure, No. 1 Furrh, in the James Short Survey, dry at 1,020 feet; and Magnolia Petroleum Co.'s No. 1 A. G. Vincent in the R. W. Bedford Survey was a 2,000,000-foot gasser, 190 pounds rock pressure, at 1,911 feet. The company's No. 2 T. C. Davis in the J. L. Matthews Survey, Panola Survey, a location, is abandoned. Natural gas Producing Co. completed No. 1 Adams in the Evans Brackins Survey, with 4,800,000 feet of gas in the shallow sand at 955 feet.

### Production Declines

Decline in daily average runs from the field in the north Louisiana and Arkansas territory amounted to 915 bbls., about 300 bbls. more than the decline during the week before. Total runs were 132,660 bbls., compared to 133,575 last week, of which Louisiana pools shipped 44,925, a decline of 410 bbls., and Arkansas 87,735 bbls., a decline of 505.

Except for Caddo light with a drop of 305 bbls., Smackover heavy 285 and Champagnolle 175, all differences were of 55 bbls. or less. Haynesville with 20 bbls. showed the largest increase. Urania and Nevada County followed with 15 each. Bellevue, Cotton Valley and Lisbon were stationary, showing an increase of 5 bbls. in daily average run. All other pools declined. Caddo heavy 55 bbls., Homer and Smackover light 50 bbls., Pleasant Hill 45, El Dorado 10, and Stephens 5. Bradley, De Soto-Red River, and Elm Grove showed no change. Runs from the several pools for the week averaged:

| Louisiana | |
|---|---|
| Caddo light | 11,265 |
| Caddo heavy | 3,890 |
| Homer | 4,390 |
| Haynesville | 6,420 |
| De Soto-Red River | 4,295 |
| Elm Grove | 560 |
| Bellevue | 980 |
| Cotton Valley | 4,525 |
| Urania | 7,965 |
| Pleasant Hill | 635 |
| Total | 44,925 |
| **Arkansas** | |
| El Dorado | 5,140 |
| Smackover light | 8,490 |
| Smackover heavy | 67,680 |
| Stephens | 1,070 |
| Nevada County | 1,825 |
| Lisbon | 3,345 |
| Champagnolle | 1,085 |
| Bradley | 100 |
| Total | 87,735 |
| Both States | 132,660 |

### NORTH LOUISIANA

#### Bossier Parish

Bellevue—Humble Oil & Refining Co.'s No. 30 Bliss & Wetherbee, Section 15-19-11, is drilling shale and lime at 5,230 feet.

Cartersville—Atlantic Oil Producing Co. set 8-inch casing at 800 feet on No. 1 Bain, Section 31-23-11, and is drilling at 3,050 feet. Magnolia Petroleum Co.'s No. 1 Cason, Section 1-22-12, is drilling at 1,957 feet. Palmer Corp. is setting screen in No. 1 G. W. Roberson, Section 26-23-12, which blew in February 18 with an estimated 2,000 bbls. oil, pinched in to two 1¼-inch choke and bridged after flowing at that rate for 12 hours, total depth 3,068 feet. Sales & Walker are repairing rig on No. 1 Kilgore, Section 31-23-11, total depth 2,815 feet. The Texas Company's No. 2 Wilkerson, Sec-

(Continued on Page 200)

## SEVERAL TESTS BEING PLANNED IN SOUTHERN EDGE OF SHREVEPORT

By D. H. Bancroft

SHREVEPORT, La., Feb. 27.—Appearance of a derrick on the Mattie Meyer plantation on the southern edge of Shreveport directed attention again this week to the activities going on in that locality, indicating there will be more or less drilling there during the next few months. Three or four large blocks have been assembled in the southern part of the parish lately between Shreveport and the old Bethany gas field but the Simmons & Harrell derrick referred to in Section 21-17-13 is the first sign of active drilling in connection with this anticipated activity. About 15 years ago, maybe not so long, a number of shallow gas wells were drilled on what is known as Hart's Island, occupied for the most part at present by Broadmoor, a populous recent addition to the city of Shreveport. This Cedar Grove Field, as it was known, yielded some good gas wells but about the time the development got going good the oil field strike came along and within a short time salt water had taken the field. The anticipated development will be of the lower sands in which a couple of wells on the Bossier side of Red River opposite Broadmoor are producing gas.

For the most part, however, wildcat activities were largely confined to attempts to dispose of offset acreage around wells scattered all through the territory. For instance, Burnham and others who blocked some leases southwest and on the edge of production in Nevada County, Arkansas, are trying to finance a well by selling offsets, and in Miller County Bruton and others are offering protection around their No. 1 Red River Lands Co. in Section 2-17-26, which is drilling, and some blocking is being done in Townships 19 and 20, Ranges 26 and 27.

### Dixie Drilling Deepest Hole

The deepest hole yet drilled in this territory is under way by Dixie Oil Co. whose No. 1 Jenkins in Section 9-12-11, DeSoto Parish, drilling for the past 30 months with cable tools, has reached 6,103 feet, 13 feet deeper than Gulf Refining Co.'s No. C-1 Willis Williams which has held the record for footage since February, 1926. It is understood they will keep on drilling until the lease expires, and possibly longer. This hole has already cost about $200,000 and has developed nothing below the previously known formations save information.

Another deep test concerning whose revelations not much information has been released, is Humble Oil & Refining Co.'s No. 30 Bliss & Wetherbee in Section 15-19-11, Bellevue Field, in Bossier Parish. While it is not so deep in footage by 873 feet, from a structural point of view it is considerably deeper as location is right on top of the dome that produced the shallow Bellevue Field. The Humble company has rig up to drill No. 1 Anderson in Section 29-18-5, Bienville Parish, which, it is understood, will be a 4,000-4,500-foot test on the Arcadia Dome, 5 or 6 miles south of the town of that name. Edwin J. Forrest, drilling No. 1 Perritt in Section 11-17-6, Bienville Parish, tested salt water in 10 feet of sand at 3,000-10 feet and again at 3,035 and 3,045 feet but is going ahead.

### Sabine Parish Plans

In Sabine Parish Riddick and others

(Continued on Page 200)

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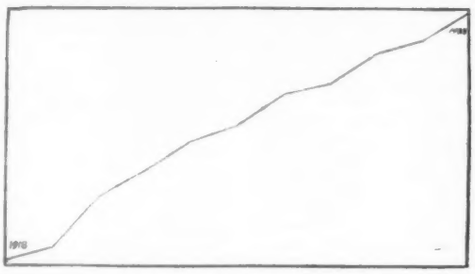

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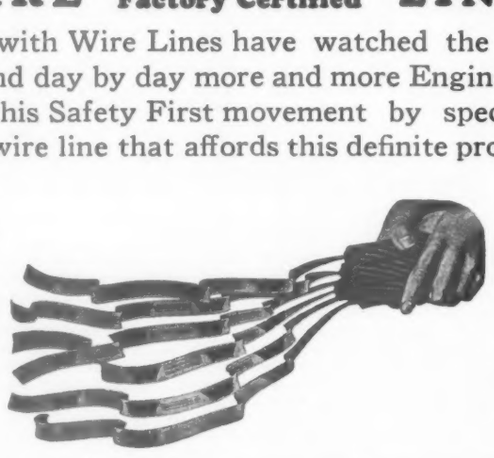

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# South Louisiana Wildcats Holding Up

## Responsible for Increase of 6,319 Bbls. in Gulf Coast Production During Week. Another Test on Sorrento Dome

By Nell Williams
*Staff Correspondent, Gulf Coast Fields*

HOUSTON, Tex., Feb. 27.—Due entirely to three wildcat producers which started flowing the previous week, daily average production in the Gulf Coast the past seven days registered an increase of 6,319 bbls. These new producers helped to offset to a considerable extent the sharp drop in output of the preceding week when the daily average flow fell to 112,864 bbls.

Although no new production of any importance was added in the Gulf Coast the past week, the three new wildcat wells have been holding up remarkably well, and as a result little change is anticipated in production figures the coming week. The three wells, all in South Louisiana, held up to an average between 5,500 and 6,000 bbls. daily during the week.

Gulf Refining Co.'s wildcat discovery on the Sorrento Dome is being considered by operators more and more as one of the most important discoveries on the Gulf Coast in several years. It is only the fact that that company controls all the acreage on and around the dome that is preventing the new pool from gaining any extensive recognition.

The discovery well still is flowing at the rate of 3,000 bbls. daily of net oil with comparatively little water additional. Operators now are waiting with interest the outcome of the company's fifth test, the No. 5 United Land Co. This test is 400 feet west of the discovery well, the No. 4 United Land Co., and is higher up on the dome. No. 5 Saturday was down 1,165 feet, where a string of casing had been cemented. The discovery well found its production between 1,660 and 1,670 feet.

### East Hackberry Well

The East Hackberry district of Cameron Parish, where the Calcasieu Oil Co. brought in the third good producer early the past week, also is destined to continue in the limelight with two additional tests nearing the producing horizon.

Calcasieu Oil Co.'s No. 1 Dorion Saturday was drilling in sandy shale below 3,700 feet, and this company's No. 2 Watkins, the latest completion, brought in early in the week, continued to flow at the rate of between 1,600 and 1,800 bbls. of net oil with only a little water as the week closed. The well came in making 2,500 bbls. daily of pipe-line oil from sand at a total depth of 3,958 feet. It extended production 217 feet north of the discovery well, the No. 2 Caldwell.

The operators in the East Hackberry Field already have made a tentative location for the seventh test, the third on the Watkins tract. In addition to these, Yount Lee Oil Co. is drilling a test in that district, the No. 6 State in Kelso Bayou, which is down around 2,000 feet.

Pure Oil Co.'s new wildcat producer, the No. 4 Sweet Lake, at Sweet Lake, Cameron Parish, Louisiana, which came in the previous week flowing at the rate of 2,400 bbls. daily of pipe-line oil, continued to hold up to an average of around 1,600 bbls. daily of net oil during the past week. Only two wells now are producing at Sweet Lake, but Pure Oil Co. is working on its discovery well, No. 3, again in an effort to revive its production.

### Southeast Texas Wildcats

While field operations were more or less routine throughout the coastal territory during the week, operators were watching closely two rank wildcats in southeast Texas, for which high hopes are held. Both tests, the first drilled on their respective domes, are nearing the interesting stage at which developments may be expected at any time.

These tests are Pure Oil Co.'s No. 1 Lost River at Lost Lake in the swamps of Chambers County, and Humble Oil & Refining Co.'s No. 1 Sugar Land Industries at DeWalt, Fort Bend County, about 20 miles southwest of Houston. Pure Oil Co.'s test already has touched what is believed the producing level at 3,575 feet and is reaming to set casing. Humble's DeWalt test Saturday was drilling shale at 2,884 feet.

### Allen Dome Operations

Roxana Petroleum Corp. is running tubing for its second small pumper at Allen Dome in Brazoria County. This is No. 4 Allen, which has been producing around 25 bbls. daily by bailing for the past 10 days. The company's No. 1 Allen Bernard was put on the pump the previous week as good for between 25 and 30 bbls. Production in each well is deep, that in the No. 4 being at 4,913 feet and in the No. 1 at 5,337 feet.

Although these Allen Dome wells are small and not profitable at their respective depths, operators generally look upon them as interesting and the possible forerunner of paying production at Allen Dome. Roxana is drilling another test on this dome, the No. 1 Random, which Saturday was drilling in a sidetracked hole at 4,647 feet in sandy shale.

Roxana, the sole operator at Allen Dome, also is interested in a neighboring dome in Brazoria County known as Clemens, on which it is drilling No. 2 Bell, at present down 5,971 feet in white blue sand, shale and lime. A new test was started on Clemens Dome during the week by Madgett & Abercrombie. This is No. 1 Davidson in the John McNeil Survey, 50 feet from the south line and 1,150 feet from the east line of the Davidson 50-acre tract.

There were comparatively few completions during the week, but of some interest was the abandonment by The Texas Company of its No. 1 Harvard, 5 miles east of Davis Hill in Liberty County. This test, which was considered as having very favorable prospects, was drilled to 5,165 feet unsuccessfully. A deep test on the Wharton County side of Boling, Southern Exploration Co.'s No. 1 Mullins, also was reported abandoned after being drilled to around 3,950 feet. Moody Corp. abandoned a Pierce Junction test, south of Houston.

### New Hardin County Dome?

Rumors were current the past week of the finding of a new salt dome in the northern part of Hardin County. Gulf Production Co. was reported doing considerable leasing there. A leasing campaign following geophysical exploration by a company in a certain district usually is taken as a strong indication of the discovery of a new dome.

Leasing also is reported as extremely active east of the Sour Lake Field of the southern part of Hardin County, where The Texas Company recently drilled a test giving favorable indications for new production. Offers as high as $1,000 an acre for some tracts are understood to have been made.

The daily average production of 119,183 bbls. in the Texas and Louisiana coastal fields for the week ending February 25 was divided by fields as follows:

**Gulf Coast**

| | |
|---|---|
| Spindletop | 37,285 |
| Saratoga | 1,004 |
| Batson | 1,374 |
| Goose Creek | 7,227 |
| Sour Lake | 3,400 |
| Hull | 11,946 |
| Big Creek | 2,025 |
| Columbia | 7,637 |
| Humble | 3,185 |
| Pierce Junction | 5,688 |
| Blue Ridge | 3,787 |
| Markham | 200 |
| Orange | 4,134 |
| Damon Mound | 825 |
| Dayton | 212 |
| South Liberty | 1,909 |
| High Island | 423 |
| Moore's Field | 57 |
| Boling | 2,492 |
| Nash Dome | 1,850 |
| Barber's Hill | 650 |
| Vinton | 4,434 |
| Starks | 256 |
| Edgerly | 1,321 |
| Evangeline | 939 |
| Lockport | 4,857 |
| Sweet Lake | 1,634 |
| Sulphur | 225 |
| Hackberry | 2,007 |
| Miscellaneous | 200 |
| Sorrento | 3,000 |
| Total this week | 119,183 |
| Total last week | 112,864 |
| Increase | 6,319 |

Daily average production in fields of Southwest Texas, according to figures compiled at Houston, totaled 27,309 bbls. for the week ending February 25, and in fields of Central Texas, 25,100 bbls. In the former district this was an increase of 632 bbls. in the daily average over the preceding week, and in Central Texas there was a decrease of 165 bbls. Production by fields was:

**Southwest Texas**

| | |
|---|---|
| Somerset | 2,135 |
| Lytton Springs | 1,504 |
| Dale | 797 |
| Luling | 14,195 |
| Miscellaneous | 8,678 |
| Total this week | 27,309 |
| Total last week | 26,677 |
| Increase | 632 |

**Central Texas**

| | |
|---|---|
| Mexia | 7,781 |
| Cedar Creek | 975 |
| Nigger Creek | 880 |
| Currie | 518 |
| Wortham | 2,045 |
| Richland | 572 |
| Powell | 12,329 |
| Total this week | 25,100 |
| Total last week | 25,262 |
| Decrease | 162 |

### Miscellaneous Texas Wildcats

At Long Point, Fort Bend County, a wildcat proposition controlled by the Gulf Production Co., two new tests are starting following the abandonment two weeks ago of two other tests. The new tests will be No. 7 Trone and No. 8 Wolf.

Humble Oil & Refining Co.'s No. 1 Wilson at Raccoon Bend, Austin County, Saturday was drilling in shale at 2,267 feet. This company also spudded in on another test in that district, the No. 1-A Grawunder.

Alexander & Lyle have abandoned efforts to fish out tools lost in their No. 1 Gobel, an Austin County wildcat, and are sidetracking. They now are drilling below 2,600 feet. Weadock and associates' No. 1 Ward, Austin County, is drilling below 1,000 feet.

In Brazoria County, Rucks and associates' No. 2 Muldoon on the E. J. Debard Survey is drilling around 1,200 feet. Another Brazoria County wildcat is Stanfield & Meyers' No. 1 McNeil, which is down about 900 feet.

B. A. Johnson made a drill stem test in his No. 1 Breeding, northeast of Sheriden in Colorado, but there were no favorable showings. The test probably will be deepened. Waldvogel and associates have started another test on the Tanner tract, 2½ miles south of Glidden, Colorado County, following the junking of No. 1. This No. 2 Tanner is 530 feet west

(Continued on Page 201)

## NASH DOME AND SOUTH LIBERTY PROSPECTS CENTERS OF INTEREST

By Nell Williams

HOUSTON, Tex., Feb. 27.—Operations in proven and semiproven fields of the Gulf Coast were quieter than usual the past week with only a half dozen small producers being completed. With few exceptions, among which are Nash Dome, Fort Bend County, the north extension to the South Liberty Pool of Liberty County, and the southwest flank of Spindletop, drilling has been confined chiefly to the routine of working over and deepening of old wells.

"Inside" work has been considerably overshadowed with several wildcat fields on the horizon drawing all the interest except for an occasional good well brought in within the proven limits or a small footage extension.

Completions and abandonments the past week were of little importance, the large new producer being only a deepened well with an initial flow of only 500 bbls. daily. However, the possibility of another new producer at Nash Dome the early part of the coming week and possibly the completion of an offset to the well which recently extended the South Liberty Field 500 feet to the north, kept up some interest in the fields.

Operations in the fields and semipools at the close of the week were:

### Blue Ridge—Fort Bend County

Operations in Blue Ridge were only routine during this week, although as the week closed three tests were to have been bailed. Blakely & Means' No. 1 Blakely has casing set at 3,300 feet. Fort Bend Oil Co.'s No. 3 Blakely also has casing set at 2,175 feet. The latter formerly has been operated by H. B. Gordon as trustee. Strainer has been set at 2,975 feet in Cunningham Production Co.'s No. 4 Blakely. H. R. Cullin's No. 1 Luscher is drilling below 2,900 feet. This operator's No. 1 Lafferty is down 3,200 feet and No. 1 Davidson at 3,440 feet. Fort Bend Oil Co. (Gordon-Folwell & Dickson) is drilling below 1,000 feet in No. 1 Blakely Gulf Production Co. has cemented casing at 4,660 feet in No. 11 West Schenck and is drilling at 3,623 feet in No. 11 Luscher. Another new test is starting at Blue Ridge in H. G. Nelms' No. 1 Overly.

### Big Creek—Fort Bend County

Gulf Production Co. got a 500-bbl. well in its No. 24 Davis. This is an old well drilled to a deeper sand at 3,255 feet. This company also has a rig up to deepen its No 39 Davis. No. 45 Davis, a new test, is drilling at 3,324 feet. The Texas Company's No. 3 Wheat is drilling below 4,100 feet.

### Nash Dome—Fort Bend County

Interest at Nash Dome, which is owned entirely by the Rycade Oil Corp., is centered in No. 22 Wisdom, which will be tested within a few days. This test is in an oil sand at a total depth of 4,535 feet with 6⅝-inch casing cemented at 4,526 feet. The last two completions at Nash Dome have made good wells and indications point to another good well in the No. 22. Rycade also is getting ready to drill two more tests, Nos. 23 and 24, Wisdom, for which rigs have been set up. No. 13 Nash lost a bit while drilling at 1,245 feet and has a fishing job.

Rycade's No. 16 Wisdom, which blew in last November making 30,000,000 feet of gas with a spray of 250 bbls. daily from sand at 4,222 feet, is to be put on the pump after having quit flowing. No.

(Continued on Page 201)

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# Important Tests in Rocky Mountains

## Several Average Completions in La Barge Field
## First Oil Run Through Line From Oregon Basin

By Tolbert R. Ingram
*Staff Correspondent, Rocky Mountain Area*

DENVER, Colo., Feb. 25.—A number of wells in widely scattered areas in Wyoming which have been standing idle for some time were reported completed and abandoned the past week. These included the California Petroleum Co.'s deep test on the LaBarge structure in Sublet County, which stopped at 4,870 feet; the Teton Petroleum Co.'s well on the McGowan Dome in Fremont County, which tested the Sundance; the Portland-Wyoming Oil Co.'s test on the Ferris Dome in Fremont County; and the Olson & Zimmerman well on the Aspen structure in Uinta County. The California Petroleum Co. had several average completions in the LaBarge Field, and Salt Creek reported no completions. Oil commenced running from the Oregon Basin Field in Park County through the Illinois Pipe Line Co.'s system constructed last year, this being oil accumulated in storage at the Cody Petroleum Co.'s No. 1 Klindt well.

In Utah interest now is centered in the Midwest Exploration Co.'s Ashley Creek well, 100 miles west of the Sundance sand wells in Colorado, which is nearing that horizon, and a new test on the Crescent Eagle Dome in Grand County is reported about to start.

In Colorado, the Union Oil Co. of California has a 500-bbl. well in the Muddy in its No. 6 Buckeye on the Wellington Dome; several average completions were reported in the Florence Field; and the Texas Production Co.'s Sundance sand test on the Moffat Dome is at a critical stage. The Parker Club's No. 1 Adams, near Branson in Las Animas County, picked up the granite at 3,863 feet, and the Kinney-Coastal Oil Co.'s Huerfano County test found the Nio-Benton sand dry. The Woods well, 5 miles west of Denver, which will test the sands in the Larmie and Foxhills formations, has commenced spudding, and oil is reported to have been found in a deeper horizon on the Fort Collins Dome in Larimer County.

New Mexico had little to report outside of routine operations with no completions during the week, but a showing for a good producer 4 miles west of Artesia Pool in the R. D. Compton's No. 4 Mann.

### Wyoming

The first movement of oil from the Oregon Basin Field in Park County, Wyoming, took place on February 17 when crude from the battery of field tanks at the Cody Petroleum Co.'s No. 1 Klindt well on the NE SE NE, Section 7-51-100, was turned into the Illinois Pipe Line Co.'s line from the field to Cody. This line was built last summer following completion of the Ohio Oil Co.'s discovery well, the No. 3 Sonners, but has never run any oil. It is an 8-inch line, 15.5 miles long. At Cody the company erected two 80,000-bbl. tanks and one 55,000-bbl. tank was constructed in the field. The Klindt well topped the Embar sand at 3,539 feet and now is down around 3,700 feet. It made around 550 bbls. per day while drilling, but apparently it has not encountered the gusher production reported in the Ohio's Sonners well in the lower Embar and upper Tensleep. It is understood that the Cody Petroleum Co.'s 1,000-bbl. flow tank and twenty 250-bbl. field tanks were full which about represents the production of the well since it entered the sand five weeks ago. The oil was mudded off for a few days until casing could be run and in the meantime it has been flowing while drilling.

Of the oil moving it is reported that five tank cars will go to the refinery at Coutts, Alberta; five cars to the White Eagle Oil & Refining Co. at Casper; and five cars to the Russell Refining Co. at Butte, Mont. It is presumed that these refineries will make test runs with a view to bidding for the production, though talk of a refinery at Billings, or Cody continues. The only tangible move in this direction so far reported was the filing at Cheyenne the past week of an application for a permit for the construction of a line from the field to Cody by representatives of the Cody Petroleum Co., or the S. C. Ferdig interests as they are better known. This company is controlled by the Yellowstone Petroleum Co. Others mentioned in connection with refinery deals are the Huber Syndicate, of Casper, and the Royal Dutch-Shell. It is not believed, however, that any actual construction will start until more wells are completed and a better lineup is secured as to what may be expected from the pool and until a better market for black oil develops.

#### Discovery Well Sanded

The Ohio Oil Co.'s No. 3 Sonners, Section 8 51-100, the discovery well which came in early in 1927 and which started the present big play, is reported to be making about 75 bbls. per day, the well having sanded up and will require cleaning. This is the well which has been reported capable of making from 1,000 to 30,000 bbls. a day. Same company's No. 1 Baston, NE cor., Section 6-51-100, on the south dome, which topped the Embar at 3,365 feet, is now drilling in after cementing the casing at 3,427 feet, at which depth a core showed saturation in the sand. It probably will be another week or two before it is known definitely what the well will do. Cable tools are being used to drill in, the rotary having been moved over to same company's No. 2 Wilson, NE cor., Section 4-51-100, which is rigging up. Same company's No. 4 Sonners, C NW NW, Section 8-51-100, is drilling at 3,070 feet. Cody Petroleum Co.'s No. 2 Klindt, Section 28-51-100, is drilling at 2,350 feet. Linco Petroleum Co.'s No. 1 Rousseau, SW SW NE, Section 33-51-100, is drilling at 2,100 feet, and its other two operations are shut down. Ostland Development Co.'s No. 1 Rausch, NW cor., Section 9-51-100, is underreaming at 1,800 feet to lower casing. Total depth is 2,079 feet. Same company's No. 1 Shaw, NE cor. NW, Section 18-51-100, is shut down at 510 feet. Continental Oil Co.'s No. 1-A State, Section 16-51-100, is still tied up with its fishing job at 1,610 feet, and the Producers & Refiners' No. 1 Frisby, SW cor. NE, Section 32-52-100, has changed over to rotary tools and is drilling again at 1,409 feet. Baston & Darrah's No. 1 Welch, Section 10-50-100, had a slight show of oil at 650 feet.

In Big Horn County, Utah Southern Oil Co.'s No. 1 Garland, NE cor., Section 29-56-97, which has been standing for some time at 915 feet, has been abandoned at that depth. Same company's No. 3, NE cor. SW, Section 29-56-97, Garland Dome, is drilling at 2,632 feet in red shale. This, apparently, is the top of the red beds. J. E. Scanlon's No. 1, NW SE SE, Section 24-51-93, on the Torchlight Dome, which has been idle for some time at 350 feet, has been abandoned at that depth. The Allen Oil Co.'s No. 1 Brown, NE SW SW, Section 2-56-98, Garland Dome, after being idle for some time, is being abandoned at 1,735 feet as a dry hole. Jess Crosby and others' No. 1, SE cor., Section 24-56-98, has moved rig away after spudding and shutting down.

#### Carbon County

In Carbon County the Producers & Refiners' No. 19, NW cor. SE, Section 25-26-87, East Ferris Dome, which gives promise of being an important discovery below its present depth, is running 6¼-inch casing to top of sand at 4,523 feet preparatory to coring into the sand. This well was reported last week flowing 25 bbls. an hour from what is believed to be the bottom of the Embar or top of the Tensleep. Same company's No. 24, NE SW SW, Section 26-26-87, is fishing for bailer at 2,625 feet, and its No. 8, NE cor. NW, Section 7-26-89, Wertz Dome, is drilling at 2,813 feet in hard gray shale. Portland-Wyoming Oil Co.'s No. 2, C SW SE, Section 28-26-86, East Ferris Dome, which has been standing for some time at 3,025 feet, has been abandoned at that depth as a dry hole. It had some gas at 2,780 feet.

In Fremont County the Teton Petroleum Co.'s No. 1, C NW NE, Section 30-1s-2e, McGowan Dome, has been abandoned at 3,305 feet. It found the Dakota dry at 2,885 feet, and cut the Sundance at 3,280-3,305 feet. The Zola Oil Co.'s rig on the NE SE SE, Section 25-27-93, has been moved away. The Producers & Refiners' No. 1, NW SE SE, Section 34-34-92, on the Muskrat Dome, is drilling at 2,640 feet in shale. The Texas Production Co.'s No. 1, Section 1-33 95, Alkali Butte Dome, is drilling at 2,455 feet.

In Hot Springs County the Westland Oil Co.'s rig in SW cor., Section 26-43-91, in the Black Mountain district, has been moved away without spudding. The Wyoming-Montana Oil Co.'s No. 1, NE cor. SW, Section 34-43-94, in the Warm Springs Field, has been abandoned at a total depth of 831 feet. The Utah Oil Refining Co.'s No. 2 State, NW SW NE, Section 36-43-91, Black Mountain Dome, is shut down for the winter at 3,240 feet.

In Johnson County the Carter Oil Co. has moved the rig which has been standing for some time for its No. 1 State, C NE NW, Section 20-48-82, Billy Creek structure. The company suspended drilling for the winter on this structure last fall when it was unable to complete its No. 2 Rider in the NW cor. SE, Section 17-48-82, which stopped at 4,398 feet to plug back to make it into a gas well. The C. L. Sackett well on C SE, Section 4-43-82, has been abandoned at 500 feet.

#### Lincoln County

In Lincoln County, in southwestern Wyoming, the test drilled last year by the Elkhorn Oil Co. and the Western Slope Oil Co. in its No. 1, NW cor., Section 7-28-111, Dry Piney Dome, has been abandoned as a dry hole at 3,488 feet. It had several good shows of oil and gas at different horizons, but nothing commercial.

In Sublet County, a disappointment has resulted in the California Petroleum Corp.'s No. 7-G (formerly No. 2), NW cor. SE, Section 34-27-113, its deep test, which has been abandoned as a dry hole at total depth of 4,870 feet. This location is in the proven area for the shallow sands in the LaBarge Field, where there is little known concerning the deeper horizons. The test had an initial production of 200 bbls. at 860 feet, at which horizon it was produced between casings, and had some shows of oil and gas at 2,900 feet. The company is not starting any new work in the field pending the construction of the pipe line to be built this spring by the Midwest interests. Prior to shutting down, it had several completions including its No. 4,, SW NE, Section 3-26-113, in sand at 1,190-1,205 feet with an initial production of 33 bbls.; No. 3, SE cor. SW, Section 27-27-113, at a total depth of 1,003 feet, with initial production of 40 bbls. from sand at 788-96 feet; and its No. 8, NW NW, Section 34-27-113, from sand at 868-77 feet, with initial production of 33 bbls.

Among recent completions and abandonments in this district are the following: Utah-LaBarge Oil Co.'s No. 1 (Britt and others), NW NW, Section 26-27-113, dry and abandoned at 1,030 feet; Midwest Refining Co.'s No. 36, SE cor., Section 21-21-113, abandoned at 1,300 feet; Good & Nutting's No. 1, SW SE SE, Section 16-27-113, dry and abandoned at 1,008 feet; H. H. Goddard's No. 1, SE SW SE, Section 13-27-113, abandoned at 107 feet; Rainbow Oil Co.'s No. 2-B, NW cor., Section 15-26-113, completed at 1,215-40 feet with an initial production of 125 bbls.; Akin Butte Oil Co.'s No. 2, SE cor. SW, Section 22-27-113, dry and abandoned at 1,220 feet; and Denver-LaBarge Oil Co.'s No. 1, NE SW SW, Section 15-27-113, abandoned at 500 feet.

The Utah Oil Refining Co.'s No. 1, SE NE SW, Section 1-28-114, was completed at 843-58 feet with an initial production of 11 bbls. after being plugged back from a total depth of 2,000 feet. Drilling operations have slowed down to a few wells. Joe Minton's No. 1, Section 34-27-113, is shut down at 1,420 feet. It topped the Milliard shale at 1,415 feet, and probably will be drilled to 2,000 feet. The Wyoming Producers' No. 1, Section 30, is drilling in hard lime and sand at 1,720 feet.

#### Uinta County

In Uinta County, Olson & Zimmerman's No. 1, Section 6-14-118, has been abandoned at 2,905 feet. It had a show of gas in sand at 2,800 feet and several shows of oil. It is on what is known as the Aspen structure. A. R. Johnson's No. 1, NW NW, Section 10-14-118, Spring Valley structure, was abandoned at 1,435 feet.

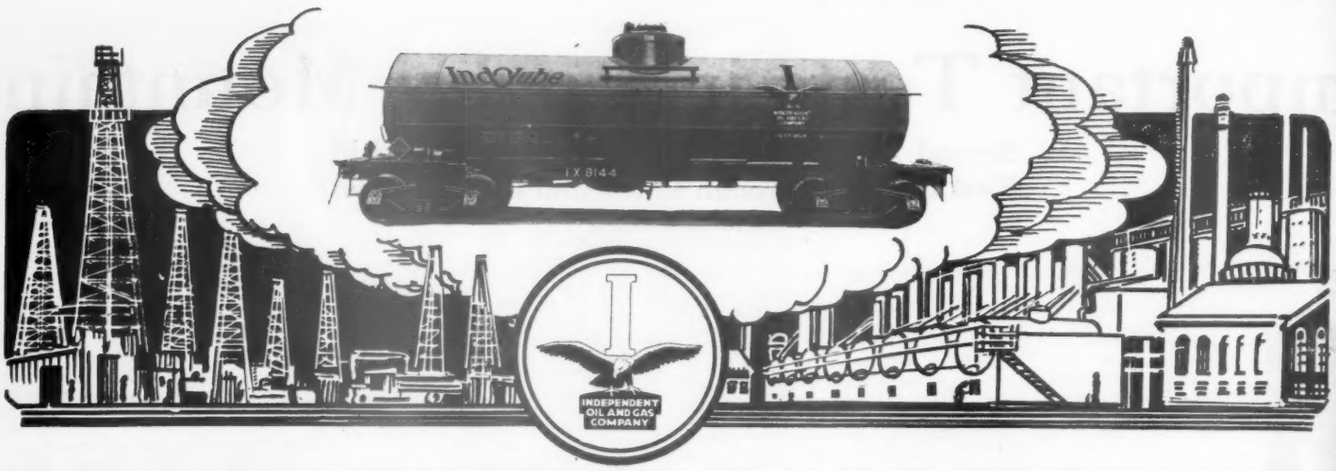
In Niobrara County, in the eastern part of the State, the Buck Creek Oil Co.'s No. 1 Delahoyde, NE cor., Section 25-37-63, on the Ant Hills anticline, is still plugging back to sand at 3,946-52 feet, from which it swabbed 250 bbls. a day for two days before drilling deeper. It was drilled to a total depth of 4,178 feet. The Dakota at 4,111-13 feet, had a show of oil and some water and the Lakota failed to improve the situation. Same company's No. 1 Peterson, NW NW, Section 30-37-62, is drilling at 3,210 feet. The company has moved away the rig without spudding on its No. 1 State, NE cor., Section 36-37-63. John Malcolm's No. 1, NE NE, Section 13-35-62, on the Seaman Hills structure, has been abandoned at 780 feet at which depth it has been standing for some time as the company was in a receivership. Hollingsworth Brothers' No. 1, SW SE SE, Section 17-39-60, Mule Creek structure, was dry and abandoned at 1,800 feet. Buck Creek Oil Co.'s No. 1, NE NE, Section 7-35-65, Lance Creek, was abandoned at 4,111 feet.

There were no completions reported for the week in Salt Creek and drilling operations are at a low ebb. The Teapot Oil & Land Co.'s No. 2, C NW, Section 30-39-78, on flanks of Teapot Dome, was abandoned at 2,225 feet. Henry Miller's No. 2, SE SE, Section 13-33-80, on the Wheeler ranch, was dry and abandoned at 1,200 feet.

### Utah

The Midwest Exploration Co.'s No. 3 Ashley Creek, NW Section 23-5s-22e, in Uinta County, 100 miles west of the Sundance sand producers on the Iles

(Continued on Page 203)

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## INDEPENDENT OIL AND GAS COMPANY

PRODUCERS AND REFINERS

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# To Shut in Heavy Crude and Save Gas

## Concerted Movement in California for Conservation and Curtailment Making Progress. Committees Active

By L. P. Stockman
*Staff Correspondent, California Fields.*

LOS ANGELES, Calif., Feb. 25.—The concerted movement under way to shut in an additional 60,000 bbls. per day of crude oil production because of the probability of having to store a considerable amount of heavy crude and fuel oil residuum during the next 12 months, and the conservation program sponsored by state officials to conserve California's natural gas resources by effecting either a substantial reduction in gas production or more general utilization, is meeting with a very favorable reception and the coordination of these two movements will result in untold benefits to the entire industry, not the least of which will be a more stabilized condition. In addition to Governor Young's gas conservation committee consisting of F. G. Stevenot, director of natural resources; A. B. Heron, director of finance; B. B. Meek, director of public works; U. S. Webb, Attorney General, and W. J. Carr, California Railroad Commission, there is another similar body functioning by appointment of a general committee representative of the entire California oil industry. This general committee, which was appointed by E. W. Clark, president of the American Petroleum Institute, consists of M. E. Lombardi, of the Standard Oil Co., chairman; William Reinhart, Shell Oil Co.; C. W. Brown, Union Oil Co.; R. D. Bush, state oil and gas supervisor; William Moeller, Jr., Southern California Gas Co.; W. L. McLaine, General Petroleum Corp.; John McKeon, Richfield Oil Co.; F. C. Van Deinse, California Petroleum Corp.; R. E. Collom, Marland Oil Co.; Dana Hogan, Pan American Oil Co.; Charles Dore, Superior Oil Co., and Paul Grim of George F. Getty, Inc.

The conservation of natural gas and the curtailment of crude oil production are so closely related that a reduction of one is naturally reflected in the other and for this reason the general committee has spent considerable time co-ordinating the reports of its crude oil curtailment and natural gas conservation committee. Crude oil production can be restricted at several points throughout the State but Ventura Avenue and Long Beach are the only two fields where there is any appreciable excess production or considerable quantity of natural gas blowing off into the air and hence natural gas conservation measures will be limited to these areas almost exclusively. The wastage of natural gas at Ventura Avenue has been common knowledge for several months but operators have consistently taken the position that the production of natural gas is of secondary importance and incidental to the production of crude oil. The 50,000,000 feet of natural gas which is blowing off into the air each day at Ventura Avenue is generally admitted to be an economic loss but producers have heretofore taken the position that the gas companies should be compelled to handle it notwithstanding the fact that this would entail the installation of additional pipe line facilities which, from an economic standpoint, would hardly be justified.

### Curtailment at Ventura

The excessive production of natural gas in the Ventura Avenue Field resulting from a continuous development program has existed for over a year, although surplus production was eliminated for several months during the summer of 1927, when operators curtailed 16,000 bbls. per day of crude oil production from May 1 to September 1. The restriction in crude oil production at Ventura Avenue last year was not undertaken primarily to reduce surplus production of natural gas but was inaugurated to alleviate excessive production of crude oil resulting from the intensive town lot drilling in the Alamitos Heights section of the Seal Beach Field. The shutting in of this 16,000 bbls. at Ventura Avenue, however, reduced the production of natural gas about 50,000,000 feet per day and eliminated the surplus which was being popped off into the air because of the inability of pipe line companies to move this commodity to the centers of consumption. When the restrictions were lifted at Ventura Avenue on September 1 following the rapid decline in production at Seal Beach, surplus production of natural gas again became a reality at Ventura Avenue although the original surplus of 50,000,000 feet was subsequently reduced 25 per cent as a result of conservation measures undertaken in October through recommendations of the Ventura Conservation Board.

The blowing off of surplus production of natural gas at Ventura Avenue began to attract serious attention during the summer of 1927, at which time the California Railroad Commission was advised by its gas and electric division that the situation deserved the serious attention of properly constituted authorities to the end that either the Waste Gas Act of 1911 be applied or remedial legislation initiated as soon as possible. During the early part of September, 1927, the California Railroad Commission was advised by its gas and electric division that "A matter outside the jurisdiction of the Railroad Commission, but apparently of sufficient importance to the people of the State to justify mention, is the tremendous waste of natural gas in southern California. The discovery and rapid drilling of new fields has resulted in a flush production of oil and a flooding of the oil market that is part of a problem now assuming national importance. The unrestricted production of oil, each barrel of oil recovered being accompanied by an average in excess of 1,000 feet of natural gas, involves a production of natural gas that is now far exceeding the possibilities of beneficial use. As this report is written enough natural gas to supply the whole city of Los Angeles or San Francisco is being wasted into the air and in all probability it will be but a few years before this gas now being wasted will have to be replaced by the costly process of manufacture from coal or oil." As a result of this report operators in the Ventura Avenue Field organized the Ventura Conservation Board and undertook a comprehensive engineering survey with the result that this surplus production of natural gas was reduced approximately 10,000,000 feet per day. Continuous development work, however, a large part of which was due to lease obligations, has more than offset the 10,000,000-foot curtailment of natural gas which has been in effect for several months and there is a present overage in excess of 50,000,000 feet per day.

### Shut-in Plans

It is the present intention of the general committee appointed several weeks ago by E. W. Clark, president of the American Petroleum Institute, to shut in every barrel of heavy unrefinable crude oil possible and to eliminate all excess production of natural gas. With this objective in view plans have been promulgated for a complete shut down in the West Front section of the Kern River Field which is producing approximately 15,000 bbls. per day of heavy crude which tests around 15 degrees. It is problematical whether the committee will be able to effect a complete shut down as the varied interests involved may not give them entire co-operation. The California Petroleum and Shell contemplate a very substantial curtailment in the Coalinga Field and the Union will probably make a further curtailment at Santa Maria and possibly at Fullerton. The Standard and Associated will restrict current production at several points throughout the San Joaquin Valley and the former will probably also shut down its entire production at West Coyote if permission can be secured of the property owners from whom this acreage is leased. The Mount Poso and

**IMPORTANT SOUTHERN CALIFORNIA WILDCATS**

| Company, Well and Location— | S-T-R. | Depth | Status |
|---|---|---|---|
| Associated, No. 1 Cypress, Potrero | 34- 2-14 | 5,408 | testing |
| Associated, No. 2 Cypress, Potrero | 34- 2-14 | 3,017 | hd. sd. drilling |
| Smith & Carpenter, No. 1 Smith, Potrero | 35- 2-14 | 5,408 | gas well |
| Pet. Securities, No. 1 Connolly, Potrero | 27- 2-14 | 4,211 | sd. sh. drilling |
| Hurst Oil Corp., No. 1 Inglewood, Los Angeles Co. | 28- 2-14 | 3,772 | suspended |
| Mont. Park. Oil Co., No. 1 Brown-Manning, Mont. Park | 26- 1-12 | 2,940 | suspended |
| Associated, No. 1 Patterson, Pico | 13- 2-12 | 5,263 | hd. sd. drilling |
| Shell, No. 1 Mission, San Fernando | 4- 2-15 | 4,950 | fishing |
| Andrews, Otis, No. 1 Lancaster, Los Angeles Co. | 23- 8-13 | 1,480 | hd. sd. drilling |
| Security Pet. Co., No. 1 Lynwood, Los Angeles Co. | 13- 3-13 | 3,840 | sd. sh. drilling |
| Dominguez Ext., No. 1 Compton, Los Angeles Co. | 27- 3-13 | 5,516 | pipe trouble |
| San Clementer Oil Co., No. 1 Peck, Hawthorne | 20- 3-14 | 5,760 | suspended |
| Shell, No. 1 Dupree, Hawthorne | 29- 3-14 | 5,304 | cleaning out |
| Scott & Currier, No. 1 Hawthorne, L. A. County | 33- 3-14 | 140 | sd. drilling |
| White Behr., No. 1 Watson, L. A. County | 21- 4-14 | 4,614 | hd. sd. drilling |
| Buttrum, F. W., No. 1 Richfield, Orange Co. | 36- 3- 9 | 3,251 | gr. sd. drilling |
| Ohio Oil Co., No. 1 Anaheim, Orange Co. | 9- 4-11 | 196 | sd. drilling |
| Olympic Refg. Co., No. 1 Sunset Beach, Orange Co. | 19- 5-11 | 4,363 | sd. sh. drilling |
| Getty, Geo. F., No. 1 Seal Beach, Orange Co. | 14- 5-12 | 1,153 | hd. sd. drilling |
| Shell, No. 1 Stern, Orange Co. | 22- 3-10 | 3,924 | hd. sd. drilling |
| Hemet Pet. Co., No. 1 Ward, Riverside Co. | 2- 5- 1 | 2,268 | hd. sd. drilling |
| Mesa Pet., No. 1 Newport., Orange Co. | 21- 6-10 | 2,011 | hd. sd. drilling |
| Davenport O. & G. Co., No. 1 San Marcos, San Diego | 30-12- 2 | 360 | hd. sd. drilling |
| Turner, S. S., No. 1 Escondido, San Diego Co. | 25-12- 2 | 346 | hd. sd. drilling |
| Mills, J. P., No. 1 Pueblo, San Diego Co. | 18-15- 3 | 2,142 | hd. sd. drilling |

**IMPORTANT NORTHERN CALIFORNIA WILDCATS**

| | | | |
|---|---|---|---|
| Bolsa Chica, No. 1 Kettleman, Kings Co. | 30-23-19 | 3,502 | plugging back |
| General Pet., No. 2 Ochsner, Kettleman Hills | 28-22-18 | 6,720 | showing oil |
| South Coalinga, Well No. 1 Kettleman Hills | 35-24-19 | 3,091 | showing gas |
| Monocline Dev. Co., Well No. 1 Kettleman Hills | 7-21-21 | 4,308 | suspended |
| McPhail, Hugh, Well No. 1, Kettleman Hills | 13-24-18 | 2,100 | bailing |
| Milham Expltn., No. 1 Kettleman, Kings Co. | 2-22-17 | 6,690 | br. sh. drilling |
| Shell, No. 2 Berlywood, Moorpark | 32- 3-20 | 6,420 | cleaning out |
| Star Petroleum, No. 2 Canet, Ventura Co. | 13- 3-23 | 5,374 | hd. sd. drilling |
| Standard, No. 4 Saticoy, Ventura Co. | 18- 3-22 | Rig | rigging up |
| California Western Oil Co., No. 1 Elkins, Ventura | 5- 3-19 | Rig | rigging up |
| Exline, Emma, No. 1 Saticoy, Ventura Co. | 33- 3-21 | Rig | rigging up |
| Petroleum Sec., No. 1 Diablo, Ventura Co. | 26- 5-18 | 4,215 | hd. sd. drilling |
| Parkford, E. A., No. 1 Strathern, Ventura Co. | 5- 2-18 | 4,002 | suspended |
| Shell, No. 1 Strathern, Ventura Co. | 6- 2-18 | 3,716 | hd. sd. drilling |
| Shell, No. 1 Oxnard, Ventura Co. | 35- 2-22 | 1,511 | sd. sh. drilling |
| Miley Oil Co., No. 1 Red Mountain, Ventura Co. | 7- 3-23 | 980 | cleaning out |
| Keck Inv. Co., No. 1 Fillmore, Ventura Co. | 35- 4-20 | 4,100 | hd. sd. drilling |
| McAdams, J. E., No. 1 Buttonwillow, Kern Co. | 26-29-23 | 4,685 | set pipe |
| Milham Explrn., No. 1-A Buttonwillow, Kern Co. | 8-28-23 | 4,662 | gas well |
| Milham Explrn., No. 2 Buttonwillow, Kern Co. | 8-28-23 | 2,730 | gas well |
| Milham Explrn., No. 3 Buttonwillow, Kern Co. | 8-28-23 | 2,565 | hd. sd. drilling |
| Doheny-Stone, No. 1 Salisbury, Kern Co. | 7-29-24 | 4,150 | will redpeen |
| Southern Calif. Gas Co., No. 1 Buttonwillom, Kern | 4-28-23 | 2,795 | gr. sd. drilling |
| Semitropic Oil Co., No. 1 Semitropic, Kern Co. | 21-26-22 | 1,618 | suspended |
| Pacific Eastern, No. 1 Union Ave., Kern Co. | 6-30-28 | 5,640 | plugging back |
| Pacific Eastern, No. 2 Union Ave., Kern Co. | 6-30-28 | 3,688 | sd. sh. drilling |
| Jackson & Chamberlain, No. 1 Bakersfield, Kern | 19-29-28 | Mtl. | building rig |
| O'Donnell, J. E., No. 1 Greenfield, Kern Co. | 31-30-28 | 690 | sd. drilling |
| Superior Oil Co., No. 1 Edison, Kern Co. | 24-29-29 | 1,829 | hd. sd. drilling |
| Stabler, W. W., No. 1 Comanche Point, Kern Co. | 23-32-29 | 898 | sd. drilling |
| Midway Northern, No. 1 Edison, Kern Co. | 29-29-30 | 3,174 | hd. sd. drilling |
| Shell, No. 1 Mon Bluff, Kern Co. | 3-28-28 | 4,150 | hd. sd. drilling |
| North American, No. 1-A Delano, Kern Co. | 5-25-26 | 4,033 | sd. sh. drilling |
| Fresno Madera Oil Co., No. 1 Clovis, Fresno | 18-12-21 | 4,005 | suspended |
| Barneyberg Oil Co., No. 1 Brown, San Luis Obispo | 26-32-14 | 2,296 | hd. sd. drilling |
| Richfield, No. 1 Wreden, San Luis Obispo Co. | 10-29-17 | 3,130 | to abandon |
| Miley Oil Co., No. 1 Carissa, San Luis Obispo Co. | 16-29-17 | 2,540 | suspended |
| Union Oil Co., No. 1 Huasna, San Luis Obispo Co. | 34-32-15 | 811 | hd. sd. drilling |
| San Luis Synd., Well No. 1, San Luis Obispo Co. | 29-31-15 | 2,219 | will test |
| Sequoia Oil Co., Well No. 1, San Mateo Co. | 13- 7- 5 | 1,398 | hd. sd. drilling |
| Shell, No. 1 Cowell, San Mateo Co. | 8- 6- 5 | 5,860 | hd. sd. drilling |
| Shell, No. 1 Butts, San Mateo Co. | 16- 6- 5 | 1,760 | reaming |
| Shell, No. 1 Mossi, Petaluma | 8- 5- 6 | 1,511 | hd. sd. drilling |
| Thomas & Hammill, Well No. 1 Alemeda Co. | 16- 3- 3 | 1,070 | water trouble |
| Tepesquit Oil Co., Well No. 1 Santa Barbara Co. | 32- 9-32 | 1,692 | sd. drilling |
| Becker, Geo. F., No. 1 Summerland, Santa Barbara | 33- 4-25 | 3,045 | br. sh. drilling |
| Twin State Oil Co., No. 1 Modoc, Santa Barbara Co | 20- 4-27 | 2,440 | sd. sh. drilling |
| Fort Wayne Synd., No. 1 Goodcell, Madera Co. | 22-10-17 | 2,250 | skid. rig |
| Continental Oil Co., No. 2 Smith, Colusa Co. | 31-18- 4 | 4,300 | fishing |
| Colusa Oil Co., Well No. 1, Colusa Co. | 31-15- 4 | 370 | hd. sd. drilling |
| Marland Oil Co., No. 1 Bradley, Monterey Co. | 32-24-11 | 122 | sd. drilling |
| Shell, No. 1 Bradley, Monterey Co. | 32-24-12 | ..... | building rig |
| North Counties Oil Co., Well No. 2 Humboldt Co. | 36- 2- 1 | 1,760 | hd. sd. drilling |

**TANKER SHIPMENTS FROM LOS ANGELES TO ATLANTIC AND GULF COAST PORTS**

| Commodity— | Total This Week | Daily Average | Total Last Week | Daily Average | This Year to Date | Same Time Last Year |
|---|---|---|---|---|---|---|
| Crude oil | 74,712 | 10,673 | 176,920 | 25,274 | 1,180,337 | 1,329,931 |
| Fuel oil | ..... | ..... | ..... | ..... | ..... | 1,675,304 |
| Diesel and gas oil | 92,650 | 13,236 | 97,957 | 13,994 | 449,739 | 594,675 |
| Gasoline | ..... | ..... | 223,446 | 31,921 | 1,652,625 | 1,583,291 |
| Coastwise— | | | | | | |
| Crude oil | 165,621 | 23,660 | 68,024 | 9,718 | 1,854,056 | 4,686,316 |
| Fuel oil | 264,344 | 37,763 | 505,733 | 72,248 | 2,693,264 | 2,472,202 |
| Diesel and gas oil | 9,955 | 1,422 | ..... | ..... | 180,678 | 45,932 |
| Gasoline | 293,376 | 41,911 | 235,292 | 33,613 | 1,779,854 | 1,441,871 |
| Kerosene | 1,565 | 224 | ..... | ..... | 14,615 | 35,738 |
| Tops | 46,992 | 6,713 | ..... | ..... | 77,492 | ..... |
| Exports— | | | | | | |
| Crude oil | 60,307 | 8,615 | 70,119 | 10,017 | 383,308 | 658,441 |
| Fuel oil | 544,911 | 77,844 | 584,652 | 83,522 | 3,931,106 | 4,727,629 |
| Diesel and gas oil | 39,797 | 5,685 | 108,647 | 15,521 | 453,081 | 83,906 |
| Gasoline | ..... | ..... | 68,331 | 9,762 | 619,526 | 95,799 |
| Kerosene | 49,052 | 7,007 | 146,489 | 20,927 | 644,942 | 361,155 |

**TANKER SHIPMENTS FROM SAN FRANCISCO TO ATLANTIC, GULF COAST PORTS**

| | | | | | | |
|---|---|---|---|---|---|---|
| Diesel and gas oil | ..... | ..... | ..... | ..... | 167,695 | 251,458 |
| Gasoline | ..... | ..... | ..... | ..... | 154,238 | 507,916 |
| Lubricants | ..... | ..... | ..... | ..... | 69,854 | 58,110 |
| Coastwise— | | | | | | |
| Fuel oil | 65,931 | 9,419 | 57,203 | 8,172 | 554,236 | 1,037,257 |
| Diesel and gas oil | ..... | ..... | 16,931 | 2,419 | 18,409 | 134,308 |
| Gasoline | 108,781 | 15,533 | 52,172 | 7,452 | 424,061 | 771,642 |
| Kerosene | ..... | ..... | 2,515 | 359 | 37,248 | 12,133 |
| Exports— | | | | | | |
| Fuel oil | ..... | ..... | 103,981 | 14,854 | 437,306 | 295,851 |
| Gasoline | 77,623 | 11,089 | ..... | ..... | 660,070 | 597,960 |
| Kerosene | 61,039 | 8,718 | ..... | ..... | 141,420 | 209,304 |
| Lubricants | ..... | ..... | ..... | ..... | ..... | 9,120 |

Round Mountain Fields in Kern County must of course remain shut in as both areas yield a heavy crude. This projected restriction in crude oil production anticipates the curtailment of approximately 70,000 bbls. per day of both light and heavy oil but it is doubtful if the total limitation effected will exceed 60,000 bbls. There is approximately 80,000 bbls. per day of light and heavy crude curtailed in California at the present time and the additional restriction of 60,000 bbls. now contemplated will bring the total shut in to around 140,000 bbls. per day.

The conservation movement of natural gas is a problem in itself as it will be necessary to shut in light refinable crude in order to effect a substantial reduction of the output of natural gas. The deep-sand exploitation now under way in the Long Beach Field will continue to add additional production of natural gas for the next several months but this can be taken care of without much difficulty. The situation at Ventura Avenue, however, presents a different condition in that existing pipe line facilities are utterly inadequate to handle any additional amount of natural gas. The capacity of natural gas lines out of Ventura Avenue is probably somewhere in the neighborhood of 150,000,000 feet per day and the 50,000,000 feet produced in excess of this figure must therefore be blown into the air or prevented from reaching the surface. In order to eliminate waste of natural gas operators in the Ventura Avenue Field will shut in approximately 10,000 bbls. of light refining crude. The curtailment of this crude oil production will reduce natural gas production in this field by approximately 50,000,000 feet and eliminate the present surplus which approximates a similar amount. The consumption of natural gas during the summer months is considerably lower than the peak load experienced during the winter and it is possible that some of the major companies may be induced to purchase any excess or surplus production of natural gas during July and August for use in repressuring sands in fields which are more or less depleted. No effective date has been set for the inauguration of the crude oil curtailment program or the projected conservation of natural gas but it is generally believed that something definite will materialize early in March. The Shell took the first step a few days ago by pinching in its No. 16 Orange, a recent completion in the Brea Olinda Field. This well was flowing better than 4,000 bbls. of light oil and 2,000,000 feet of wet gas per day but has been pinched in to approximately 2,000 bbls. of oil with a corresponding reduction in gas production.

### Long Beach

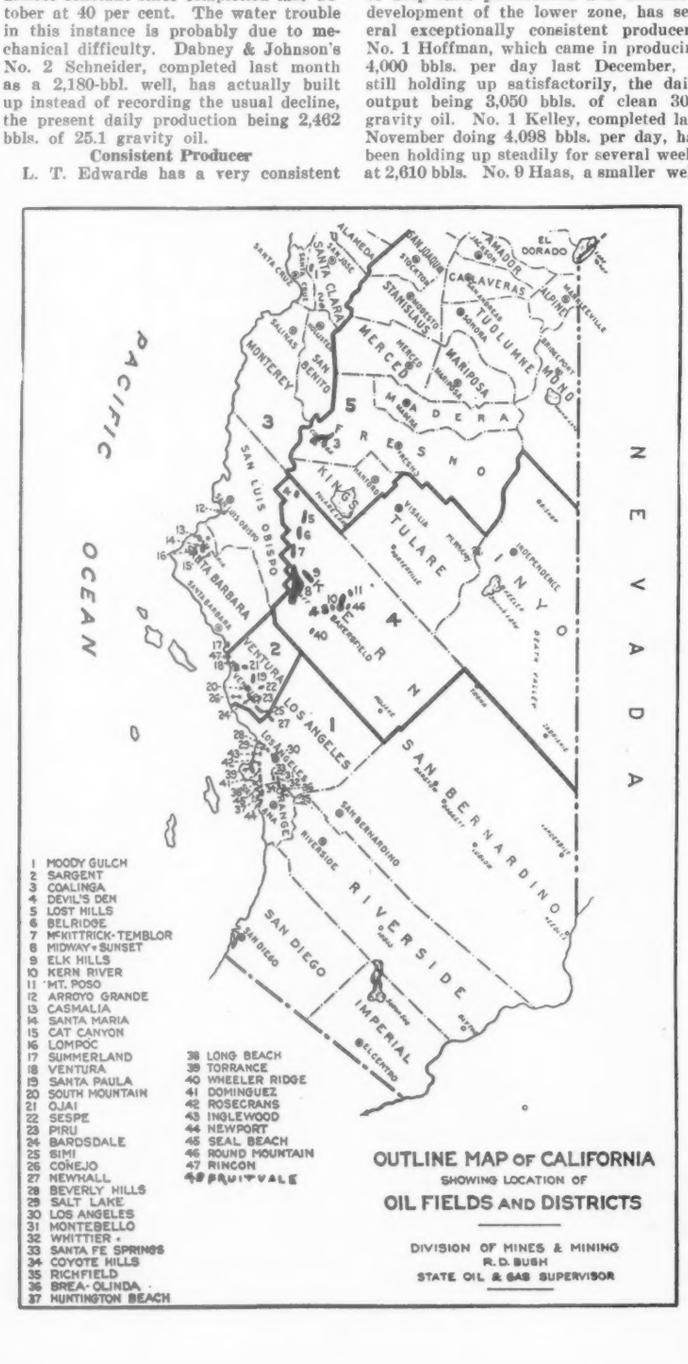
Although completions in the Long Beach Field were not very numerous during the week, new wells and recompletions should become more frequent and March, April and May should witness the completion of something like 100 deep sand projects now under way. It is needless to say that the daily output of this field will reflect this deep-sand exploitation in a very substantial manner, especially as completions during the next 90 days may average one new well every 24 hours. Production during the past several weeks has shown a consistent gain and while the increase from week to week has been limited to a few thousand barrels per day the trend is definitely upward and a very sharp upswing may be anticipated in March. The 1928 peak at Long Beach is variously estimated at from 150,000 to 175,000 bbls. per day, with the high expected to be reached some time during May. There has been a very noticeable decline in initial production of new wells for several weeks and while future completions will naturally show a smaller initial and consequently limit the 1928 peak to some extent, the large number of new wells scheduled for completion will offset this condition.

A check of the various projects finished in the deep zone below the 5,500-foot level at Long Beach during the past several months does not reveal any abnormal decline although recent completions have not shown as large an initial production as wells brought in 60 days ago. A natural settling has taken place in each producing well of course but in practically every case the daily output has been relatively stable after the first initial decline. The Bush-Voorhies Oil Co.'s No. 2 Graham is still doing better than 50 per cent of its initial production and this well, completed last December doing 1,048 bbls., is making 750 bbls. of exceptionally clean 29.9 gravity oil daily. The California Western's No. 1 Havenstrite & Baker, which came in about the same time flowing 3,120 bbls. daily, is making 2,410 bbls. of unusually clean 29.6 gravity oil. This company has a second well on the same property scheduled for early completion. E B. Campbell's No. 1 Long Beach, brought in flowing 4,000 bbls. per day last November, is making 1,825 bbls. every 24 hours and while the decline is larger than that which has taken place in other early completions this is due to Campbell's producer being an edge well and has been showing an excessive water content dating back almost to the original completion. J. J. Doyle's No. 2 Long Beach is another project which has shown an excessive water content, the cut being almost constant since completion last October at 40 per cent. The water trouble in this instance is probably due to mechanical difficulty. Dabney & Johnson's No. 2 Schneider, completed last month as a 2,180-bbl. well, has actually built up instead of recording the usual decline, the present daily production being 2,462 bbls. of 25.1 gravity oil.

### Consistent Producer

L. T. Edwards has a very consistent producer on the Brayton lease and this well, which registered an initial daily production of 3,012 bbls. last October, is yielding a little better than 2,200 bbls of 27.4 gravity oil. The Graham and Loftus Oil Co.'s No. 1 Butler is another exceptionally consistent producer, the present output being 2,224 bbls. of exceptionally clean 29.1 gravity oil daily, compared with the initial daily production of 2,315 bbls. early last December. The A. T. Jergins Syndicate's No. 2 Jackson is also holding up very nicely, the daily production of 2,110 bbls. of clean 30.6 gravity oil being only 840 bbls. less than the initial flush production in November, 1927. McMillan & Campbell's No. 1 Long Beach is flowing 1,448 bbls. of clean 29.4 gravity oil, compared with a first full 24-hour production of 1,740 bbls. 30 days ago. The latest completions at Long Beach include Rio Grande's No. 1-B Municipal, a recompletion returned to production flowing 430 bbls. per day after being redrilled and deepened to 5,663 feet. The Acme Petroleum Co. finished its No. 7 in the shallow zone at 4,452 feet which showed an initial of 128 bbls. of 24.1 gravity oil daily.

The Richfield Oil Co., which has become the largest single producer in the Long Beach Field through appreciation of deep sand possibilities and consistent development of the lower zone, has several exceptionally consistent producers. No. 1 Hoffman, which came in producing 4,000 bbls. per day last December, is still holding up satisfactorily, the daily output being 3,050 bbls. of clean 30.1 gravity oil. No. 1 Kelley, completed last November doing 4,098 bbls. per day, has been holding up steadily for several weeks at 2,610 bbls. No. 9 Haas, a smaller well, is making 425 bbls., compared with an initial of 675 bbls. last December. The Richfield, Shell and California Petroleum are the three outstanding producers in the Long Beach Field, their individual pipe line runs during the week being 18,750 bbls., 17,888 bbls. and 10,246 bbls. respectively. Total deep sand production of the Long Beach Field aggregates a little in excess of 50,000 bbls. per day.




### Making Better Footage

Practically all of the new wells and deepening projects headed down for the lower horizon at Long Beach made better than normal footage during the week and, while drilling naturally slowed up very appreciably after the 5,000-foot level is passed, several drilling wells chalked up more than the normal allotted footage below this point. There are quite a number of projected deep zone wells listed for early completion and, while it is impossible to figure the exact date on which they will be tanking oil, it is believed at least 25 potential producers will be finished between now and the close of March. The California Petroleum should bring in about eight wells within 30 days, one of which, No. 2 on Griswold Lease No. 1, should be completed before the end of February. The California Western's No. 2 Havenstrite & Baker is also expected in momentarily. The General Petroleum will probably finish 4 wells within a month, the Pan American 3, Richfield 4, Shell 10, Superior 3 and Union 2.

The California State Fish and Game Commissioners, who have filed a number of complaints against operators in the Huntington Beach and Long Beach Fields during the past several months, made a personal visit to Long Beach during the week and inspected the facilities of the Oil Operators, Inc., a non-profit, co-operative concern organized for the purpose of preventing pollution of the ocean waters by affording operators an outlet for waste water and sump oil through a waste oil disposal system. Approximately $200,000 has been expended in the acquisition of land and the construction of pipe lines and sump holes. A new catch basin has recently been constructed near the east bank of the flood control channel and a larger sump to the north is under construction. The Oil Operators, Inc., has a membership of over 100 operators, the construction and maintenance cost being prorated according to the number of wells participating. The Shell is not a member, although it would have undoubtedly become affiliated if it had not previously undertaken the construction of a similar project for its own properties.

### Seal Beach

The limited production secured by the Marland and Richfield in the recently discovered Bonner zone, located below the 6,000-foot level in the Seal Beach Field, has had a tendency to hold up deepening operations pending additional development. The Richfield company's No. 1 Bonner at Alamitos Heights, the first successful producer in this zone, is making 350 bbls. under gas compression, while the Marland's No. 16 Selover, which offsets the town lot area, is flowing 400 bbls. daily from the 6,608-foot level. The Marland has four additional wells in the northern part of the Selover lease headed down for the new deep horizon and two of these, Nos. 13 and 19, should prove conclusive tests due to the knowledge gained from Nos. 11 and 16, the first two wells on this lease to test out the total thickness of sand. The Petroleum Securities has decided to make a bid for this new deep sand production and Nos. 2 and 6 on the Naples property at Alamitos Heights have been killed preparatory to a resumption of work. George F. Getty is making good footage in his No 12 Alamitos scheduled for early completion in the Bonner zone and this project should be ready for a test within 15 days unless some unforeseen delay is encountered. Paul Getty has also decided to try out the new lower horizon and No. 2 fee has been selected as an initial test. The Associated finished an exceptionally good well in the extreme eastern part of the Seal Beach

(Continued on Page 198)

# Fair Producers in the Eastern Fields

## Larger Number of Completions Than in Any Week for Long Period. Most Were Gassers but Many Dry Holes

By D. S. Wakenight
*Staff Correspondent, Eastern Fields*

PITTSBURGH, Pa., Feb. 25.—The mild winter weather has permitted drilling programs to continue with the result the present week has a larger number of completions than any for a long period. None of the wells was large but some will make quite fair producers, the major part of them gas wells, with an unfortunate number of dry holes. The drilling was confined largely to well defined drilling programs, with here and there a test well of no especial importance.

**Best Wells of the Week**

In Licking County, Hanover Township, Section 14, the Hope Construction & Refining Co. completed its test on the W. L. Prout farm to the Clinton at 2,784 feet and after shot the well produced 40 bbls. the first 24 hours. The Gordon Oil Co. completed its No. 5, the James Noble farm, SE quarter, Section 14, Washington Township, Hocking County, to the Clinton at 2,870 feet and it is showing for a 12-bbl. producer after shot.

In Athens County, Athens Township, Lot 60, the Athens State Oil & Gas Co. completed its No. 10 on the State of Ohio farm to the grit at 1,147 feet and have a gasser good for 1,000,000 feet.

In West Virginia the only well of any size completed was in Scott District, Putnam County, where the Tampico Oil & Gas Co. completed its test No. 1 on the E. W. Finley to the Salt sand and have a gasser good for 1,500,000 feet.

The well completed the latter part of last week by the Heck Oil Co. on the J. W. Conley farm, Reedy District, Roane County, which came in good for 130 bbls. per day, is now doing 60 bbls. during 24 hours.

In northeast quarter section of Lot 9, Strongville district, Cuyahoga County, Hulse & Kuntz completed their well on the William Loder farm at 3,009 feet to the Clinton and it produced 10 bbls. the first 24 hours after shot. The Empire Gas & Fuel Co. completed its test on the George M. Ganyard farm to the Clinton at 3,300 feet and after shot produced 8 bbls. the first 24 hours, noting that this well was plugged and only a small pocket exhausted in four days. This is located in the northeast quarter section of Lot 43, Granger Township, Medina County.

**Light Gassers in Morgan County**

The Federal Valley Oil & Gas Co. completed its test on the Lucinda Engle farm, 3 miles west of Chesterhill, Section 25, Marion Township, Morgan County, to the stray below the Berea at 1,618 feet and it is a light gasser good for 168,000 feet. In the same township and county, Section 32, Carl Hallowell and others completed their No. 2 on the Carl Woodyard farm to the stray below the Berea at 1,527 feet and it is also a light gasser good for 116,000 feet.

In Hocking County two wells were completed, the first in section 15, Washington Township, on the W. H. Mowrey farm, by the Hope Construction & Refining Co. to the Clinton sand at 2,852 feet, and it is a gasser good for 250,000 feet. In southwest quarter Section 30, Starr Township, the Duffey Oil & Gas Co. completed its test on the Pearl Duffey farm to the Clinton at a depth of 3,000 feet and it is dry.

In Section 14, Franklin Township, Licking County, the Detex Oil & Gas Co. and others completed their No. 8 on the G. E. Cotterman farm to the Berea at 745 feet and it is showing for a 3-bbl. pumper. In southwest quarter Section 32, Enoch Township, Noble County, Way Wickers and others completed their No. 2 on the John Crock farm to the Berea grit at 1,530 feet and it is a light gasser good for 45,000 feet.

**Duster in Perry County**

The Rodgers heirs drilled their test on the Rodgers farm, in northwest quarter Section 21, Harrison Township, to the Clinton sand, at a depth of 2,730 feet and it is dry.

In northeast quarter Section 21, David L. Melick, trustee, completed the test on the Charles Buckner farm to the Clinton sand. One-half barrel was swabbed during the first 24 hours after shot and they intend to shoot it again in a few days. This is in Harrison Township, Perry County.

In southeast quarter, Section 5, Hopewell Township, Muskingum County, the Hope Construction & Refining Co. completed its No. 1 on the J. M. Sidle farm to the Clinton at 3,150 feet and after shot it produced 3 bbls. the first 24 hours. The Ohio Oil Co. completed its test on the H. Jones farm, northwest quarter, Section 17, Richland Township, Holmes County, to the Clinton and have a dry hole with a very light showing of gas.

**West Virginia**

A very fair well was completed by the South Penn Oil Co. on Macfarlin Creek, Murphy district, Ritchie County, on the Anna M Wilson farm, where the well was drilled to the Maxon sand, and is showing for 30 bbls. a day. In Murphy district, Ritchie County, the Osborne Oil Co. completed its test on the M. A. Osborne farm to the Injun sand and it is a light gasser.

In the same district and county, on the divide between Laurel Run and Bear Run, the Hope Natural Gas Co. completed its No. 2 on the W. W. Lawrence farm through the salt sand and found it dry. At that depth it has a fishing job, and if the tools are recovered the well will be drilled to lower sands.

On Paw Paw Creek, Paw Paw district, Marion County, the Owens Bottle Co. completed its No. 1 on the New Central Coal Co. property to the Gantz sand at 2,545 feet and it is a fair gasser. On Finches Run, Fairmont district, Marion County, Mack Bell Oil & Gas Co. completed its No. 1 on the O C. Prickett farm to the Big Injun at 1,953 feet and it is also a fair gasser.

In Cabell County, Grant district, on the waters of Mud River, the Aetna Oil & Gas Co. completed its No. 2 on the H. R. Hatfield farm to the Berea sand and after shot it is a gasser good for 200,000 feet. In the same county, Barboursville district, the same company completed its No. 1 on the J. M. Lewis farm at 3,620 feet and has a dry hole in all formations. This test was on Little Cabell Creek about 3 miles northeast of Barboursville.

In Grant district, Harrison County, the West Virginia Natural Gas Co. completed its test No. 1 on the W. B. Maxwell farm to the Benson sand at 4,110 feet and dry. In Union district, Harrison County, the Reserve Gas Co. completed its test No 1 on the T. L. Eavens farm to the Speechly sand and have a small gas well. On the waters of Walker Creek, Clay district, Wood County, Ira Connelly completed his No. 1 to the Big Injun sand on the N. L. Upton farm and it is dry.

**Ritchie County**

The Astron Oil Co. completed its No. 8 on the Herman Stursburg farm, Grant district, Ritchie County, to the Big Injun and have a 5-bbl. pumper. In the same district and county, the Del Rio Oil Co. completed its No. 6 on the Cornelia Storrs farm to the Squaw sand at 1,883 fete and it is good for a 15-bbl. well.

In Murphy district, Ritchie County, on the J. W. Grim farm, Park Bowser completed his No. 1 test to the Injun at 1,810 feet and it is a gasser. George Pickens and others completed a test on the Thomas McTaggart farm, Grant district, Pleasants County, to the Keener sand at 915 feet and have a 10-bbl. producer.

**Gilmer County**

The Hope Natural Gas Co. completed No. 7176 on the Katy Wilt farm, DeKalb district, Gilmer County, at 2,085 feet and it produced 1 bbl. natural the first 24 hours. In the same district and county the Hope Construction & Refining Co. completed No. 1048 on the Fred S. Wilt farm at 1,720 feet and it was good for 6 bbls. natural the first 24 hours. In the same district and county, Satterfield and others completed their No. 1 test on the F. N. Gainer farm at 1,881 feet and it is a light gasser.

**Calhoun County**

Smith & Starcher completed their test on the Anna Slider farm, Lee district, Calhoun County, at 1,885 feet and it is a light gasser. In the same district and county L. L. Lynch completed No. 2 on the Kingsbury and Dollman at 2,127 feet and it is dry in all formations. In Sherman district, Calhoun County, on the Spencer White farm, C. B. Lewis and others completed their No. 1 test at 1,995 feet and it is a gasser.

In Ravenswood district, Jackson County, M. E. Horsman and others completed their test on the Kenna Hutchinson farm to the Berea at 2,355 feet and it is dry.

**Late Completions**

In southeast Ohio, there were but two wells completed at the close of the week, one with a showing of oil which was abandoned and the other dry.

On the east part of Lot 463, Eddison Township, Gallia County, the Preston Oil Co. completed its No. 1 test on the Emmitt Elliott farm to the Berea grit at 1,660 feet and it was dry. Blackburn & Co. completed its No. 1 test on the E. T. Castner farm, west quarter Section 3 Island Creek Township, Jefferson district, to the Berea and had a nice showing of oil but the sand was very thin. After shot with 40 quarts it looked for a while as though it would be good for a one-half bbl. pumper but it was finally abandoned for a new location.

In West Virginia there were several new completions but none of any considerable size and mostly confined to gas wells and dry holes.

In Eagle district, Harrison County, the White Top Oil Co. completed its well No. 7 on the J. F. Allen farm to the Gordon at 2,268 feet and have a fair gasser. In the same county, Simpson district, the Aizpurin Oil Co. completed No. 7 on the J. C. Barnes farm to the Fifth sand and have a gasser at 2,280 feet.

**Roane County**

The United Carbon Co. completed its No. 2 on the J. E. Keene farm, Geary district, Roane County, to the Injun at 1,650 feet and have a gasser. The United Fuel Gas Co. completed No. 1857 on the O. V. Ashley and others farm to the Big Injun at 2,153 feet and have a fair gasser.

In New Milton district, Doddridge County, George Ahouse completed his test on the Seven Day Baptist Parsonage Lot to the Big Injun at 1,834 feet, and it is dry. In Harvey district, Mingo County, the Public Gas Corp. completed No. 29 Logan Cannel Coal Co. to the Maxon sand at 1,220 feet and it was also dry.

C. M. Knowlton and others completed

(Continued on Page 194)

# ROYALITE HAS FIVE NEW LOCATIONS IN TURNER VALLEY, CANADA, FIELD

By Victor Lauriston
*Staff Correspondent, Canadian Fields*

CHATHAM, Ontario, Feb. 25.—In the Turner Valley Field, southwest of Calgary, Royalite Oil Co.'s No. 11, LSD 10, Section 12-20-3w5, spudded in last week, and is reported drilling around 95 feet. Royalite's No. 10, NE, Section 12-20-3w5, which recently got a show of light oil in the upper Dakota at 2,332 feet, is conducting bailing tests. The sand at first looked good for around 30 bbls. a day, but the results of the bailing test are not yet known. No. 10 will likely be carried deeper.

In addition to No. 11, which has just started drilling, Royalite Oil Co. has five new locations in the Turner Valley Field. Location for Royalite No. 12 is merely tentative; but No. 13 is starting to rig up in LSD 6, Section 13-20-3w5. No. 14 is spotted in LSD 4, Section 7-20-2w5. Royalite No. 4 naphtha gusher was drilled in LSD 12 of the same section. No. 15 is located in LSD 1, Section 12-20-3w5, and No. 16 in LSD 2, same section. Several of these tests are expected to start work before the middle of March.

**Drilling Plans**

In a forecast of drilling operations in the Canadian West, President C. O. Stillman of Imperial Oil, Ltd., states:

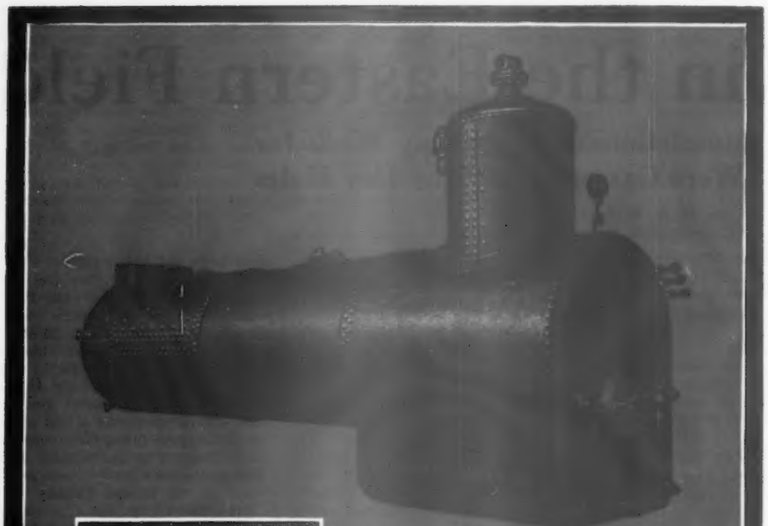
"The Turner Valley Field continues to present extraordinary drilling difficulties. Both cable and rotary equipments are being operated, and it has been found expedient in certain instances to utilize diamond drills. Each of these methods has its advantages, but none is entirely free from those drilling obstacles which the structure in the Turner Valley seems to accentuate. Progress is therefore slow and there are no completions to report in this particular field during 1927. The Royalite No. 7 well, however, has been carried down into the limestone where wet gas in considerable quantities was encountered. To meet the heavy winter demand for gas in Calgary, drilling has been suspended and the gas turned into the line, but as this demand falls off, the well will be completed.

"A number of these wells are approaching production in one or other of the recognized horizons; Dalhousie No. 5 is already producing a fair amount of crude oil and a number of completions are expected at an early date.

"At other points in the Foothills belt tests are, or have been in progress. We have taken over a partially drilled well from the Dolomite Oil Co., (LSD 8, Section 1-20-3w5) which will be completed as No. 2 Foothills. The Bow River well, (LSD 15, Section 12-25-5w5) having apparently drilled through a fault which precluded its reaching the presumed oil-bearing rocks, was abandoned at a depth of 5,287 feet.

"The No. 1 Highwood well, (LSD 3, Section 36-18-3w5) is drilling at 3,620 feet. No. 1 Foothills, on Hudson's Bay

(Continued on Page 194)



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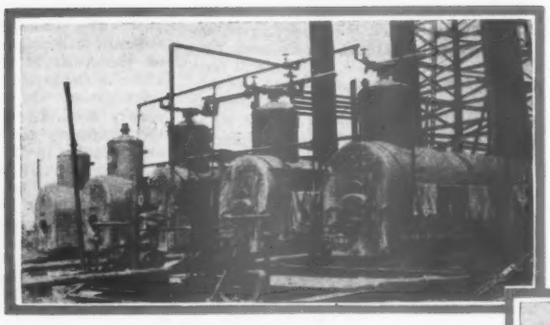

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"OILWELL" Boilers in California

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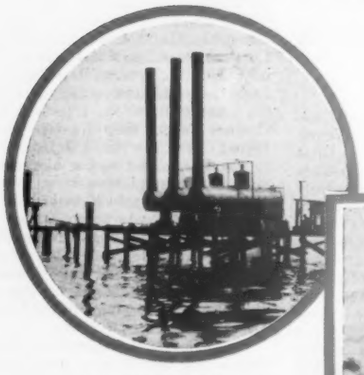
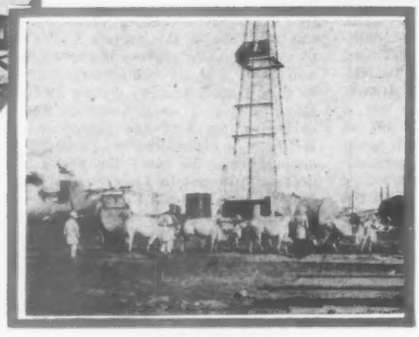
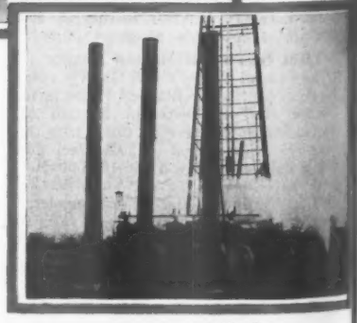


"OILWELL" Boilers in Venezuela



"OILWELL" Boiler in Punjab, India



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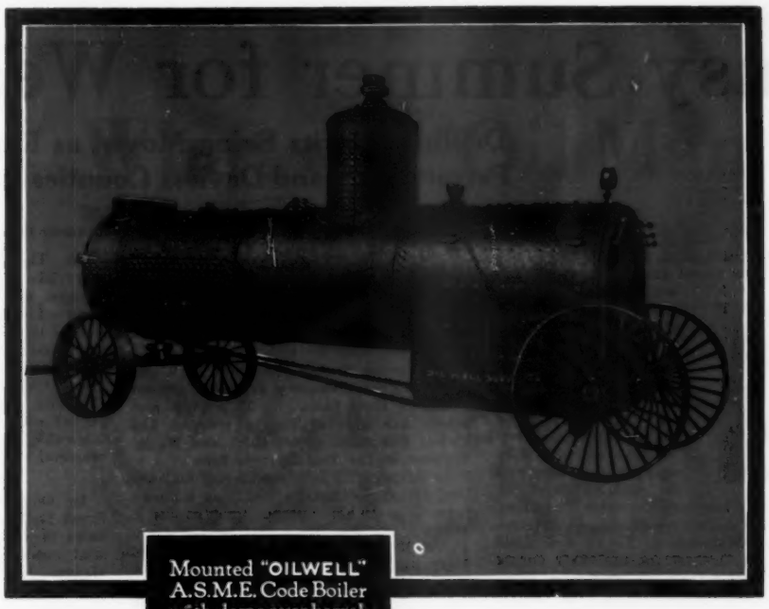

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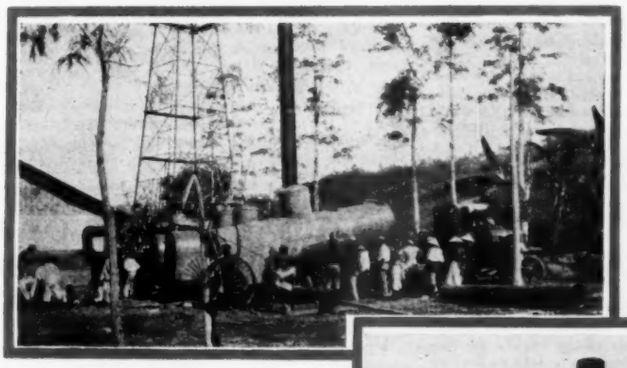
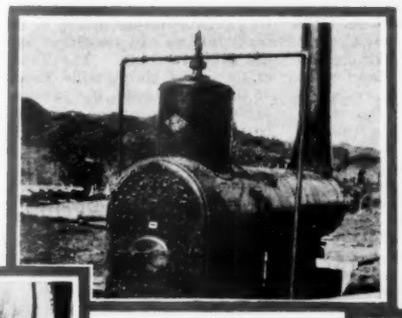
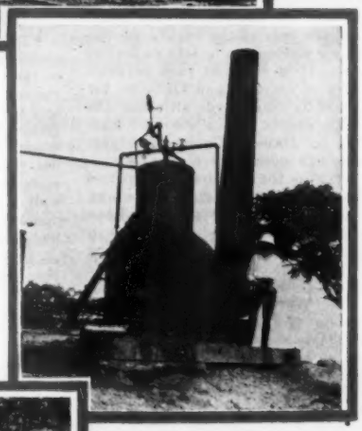


"OILWELL" Boilers in Java

"OILWELL" Boiler in France



"OILWELL" Boiler in New Zealand



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# Busy Summer for Western Kentucky

## Drilling Outfits Being Moved as Rapidly as Bad Roads Permit. Ohio and Daviess Counties Center of Operations

By Whit
*Staff Correspondent, Kentucky-Tennessee*

HARTFORD, Ky., Feb. 26.—The only well of note found and reported for the week in Kentucky was the Creek Drilling Co.'s No. 8 on the Bartlett heirs' lease, in the Ambrose Pool, with an initial reported at 150 bbls. Drilling outfits are being moved in the western division of Kentucky as rapidly as they can be handled over the bad roads. Leasing activities are being maintained and extensions of the development into Muhlenberg, Logan and Todd Counties is forecast for the early spring by the blocking up of numerous large blocks of leases with a view of testing them out as soon as road conditions will permit of drilling rigs being transported over the highways. Roads throughout the back countries, except the state highways, are impassable at this writing, the operators and scouts report, but the scouts are riding through the several counties getting locations for drilling as soon as conditions will warrant. Blocks from 5,000 to 9,000 acres have been reported as picked up for operations when possible. The most interesting of the wildcats at this time is that being drilled by the Ohio Oil Co. on the Central Land Co.'s acreage, at the edge of Central City, in Muhlenberg County. This test will be a deep one unless a big producer is found at a more shallow depth. The work is being done by a standard outfit on a block of 5,000 acres which is being drilled for the purpose of testing out the possibilities of the lower formations.

In Daviess County, Miller & Damron have their test on the Jim Brown farm, in the southern part of the county, on the pump and its production is said to be 200 bbls. a day. It is nip and tuck between the counties of Daviess and Ohio, so far as new work is concerned, although the Ohio County end is far in the lead with production, as Daviess County the past few months has shown a remarkable gain by such wells as the Hayden, Brown and others, that make such good showings, and the areas along the Daviess-McLean County line, as well as along the western portion of Ohio County, are showing up some unexpected production and the operators are going to work it thoroughly.

### Week's Work

A summary of the week's work in the Kentucky fields shows 23 completions, 15 producers with an initial production of 335 bbls., 7 dry holes and 1 gas well. Compared with the previous week, there were 10 more completions, 4 more producers, 1,354 bbls. less new production, 5 more dry holes and 1 more gas well. The wells were distributed by counties and districts as follows:

| County— | Oil Comp. | wells | Prod. | Dry | Gas |
|---|---|---|---|---|---|
| Ohio | 6 | 4 | 210 | 2 | 0 |
| Daviess | 5 | 2 | 52 | 2 | 0 |
| Estill | 5 | 3 | 5 | 2 | 0 |
| Johnson-Magoffin | 4 | 4 | 41 | 0 | 0 |
| Hancock | 1 | 1 | 25 | 0 | 0 |
| Elliott | 1 | 1 | 2 | 0 | 0 |
| Floyd-Knott | 1 | 0 | 0 | 0 | 1 |
| Total | 23 | 15 | 335 | 7 | 1 |
| Last week | 13 | 11 | 1,689 | 2 | 0 |
| Difference | 10 | 4 | 1,354 | 5 | 1 |

### Eastern Division

A few small completions are reported from the eastern division of Kentucky, and work is getting very slack in that part of the State. In the Irvine Field of District 8, Estill County, Brenner, Adams and others' No. 11 on the Kate Sawyer farm is a 3-bbl. pumper. Wood Oil Co.'s No. 6 Isaac Henry farm is good for only 1 bbl. Superior Oil Corp.'s No. 33 J. D. Alexander farm is a 1-bbl. pumper, while parties drilled to a depth of 720 feet on No. 34, same farm, is dry. In District 7, Levy and others have a dry hole in a second test on the John Beckley farm. McEldowney, Bowser and others are due in with No. 4 on the George Reed heirs farm, same district.

In District 20, Torrent Field, in Wolfe County, Amp Nurnett is drilling a test on the John Bush farm. M. B. French and others are also drilling a test on the Dewey Chapman, as are R. L. and W. M. Spencer on the Bud Spencer farm.

In District 27, Johnson-Magoffin Counties, Henry Lemaster's No. 3 on his own farm is a 10-bbl. pumper, and James & Wagner are starting a test on the Dora Fairchild farm. In District 31, Hupp, Duff and others' No. 1 on the Pierce Bailey farm is a 20-bbl. pumper, and their No. 6 on the B. F. Whitt No. 2 farm is good for 6 bbls., while No. 2 on the Malcomb Whitt farm is a 5-bbl. pumper.

In District 34, in Elliott County, Isom & Peters' test on the Gales Peters farm is a 2-bbl. pumper.

In Floyd-Knott Counties, the New Domain Oil & Gas Co. struck a nice gas gas well in No. 4 on the Esther Horton farm in District 21.

### Western Kentucky

New drilling outfits are starting in many of the counties in the western division and the coming summer will see one of the big oil plays in the history of the State. The territory to be drilled looks more like the Big Sinking Field in the eastern division than any other area known in the borders of the Blue Grass State. Work has started to pick up along the division line of Daviess and McLean Counties, also along the division lines between Ohio, Daviess and McLean Counties, and a heavy play of the drill is expected when the weather conditions are favorable for the moving of the heavy material over that part of the country.

### New Completions

In Ohio County, Ambrose Pool, the Creek Drilling Co.'s No. 8 on the Bartlett heirs farm is credited with 150 bbls. initial production at a depth of 765 feet. George Randolph's No. 4 on the Joe Maiden lease, in the Sunnydale Field, is good for 5 bbls. This well is on a 357-acre lease, and within what looks to be very favorable territory. The oil pay was found at 511 feet. The Ohio Oil Co.'s No. 1 on the Foreman lease, near Dundee, in the Sunnydale division, is reported showing for 30 bbls. at a depth of 325 feet. Jordan, Short and others' No. 2 on the Gilbert Jolly farm, west of Buford and in the western part of the county, is estimated as a 25-bbl. producer. Near Buford the Globe Oil Co.'s second test on the Vincent J. Steele's chicken farm is reported dry at 1,183 feet. Unknown parties drilled to a depth of 720 feet on the Thompson Rabbitt farm, and it is pronounced a dry hole.

In Daviess County, in the Roby Pool, southwest of Pellville, the Leeper Oil Co.'s No. 7 on the John Roby 90 acres is a very good well reported at 50 bbls., but is said to have pumped close to 200 bbls. initial. D. T. Bolling and others' test on the Hazel Miller-Aud farm is reported good for around 2 bbls. Orville Jenkins' test on the J. W. Woodson 2 acres is reported dry. Bert Thompson has one of the same kind at a second test on the Frank Pulliam farm. Reports were heralded that the test of Samuel J. Patrick & Son on the Fred Burns farm, 8 miles south of Owensboro, had struck oil a few inches in a sand found at 1,405 feet and caused considerable excitement as it is the closest point to Owensboro that oil has been found, but when drilled a little deeper to 1,420 feet, a heavy salt water vein was struck and the well will be abandoned.

One interesting late wildcat was drilled by Chicago Petroleum Syndicate on the J. B. Taylor farm, 5 miles south of Lewisport in the northwestern part of Hancock County, northeast of Owensboro, not far from the Ohio River. It is said to show for a 25-bbl. well, and if true it will mean the opening of an entirely new producing region for the State. The well's depth is reported at 724 feet.

### Field Pickups

E. E. White, prominent operator from Paintsville, Ky., has purchased from J. S. Patton a half interest in his producing properties in the Sunnydale Field of Ohio County for a reported consideration of $127,000 for the seven wells and the remaining production on a block of between 200 and 300 acres. Mr. White will develop the new holdings, while Mr. Patton will develop other leases he holds in the county. This is probably the largest single deal made in this territory to date.

Tom M. Hunt of Bowling Green, Ky., and George L. Kerr of Olean, N. Y., have started a well on the Bean farm in Ohio County, and to the southwest of Basham. They expect to drill several tests in that part of the county. T. M. Hunt has been in the Bowling Green Field operating ever since the field was opened up, and is well versed in the game.

The Barnard-Rial Oil Co. is starting a well on the J. W. Whitehouse farm, about 2½ miles southeast of Maxwell, on a 2,000-acre block in Ohio County.

Lewis E. Howard of Buffalo, N. Y., announces the purchase of a one-half interest in the well drilled by Percy Jolly on the Stevens farm in Daviess County. This well has a very nice oil showing but drilled into water, and attempts will be made to put it on production. Mr. Howard was identified with N. E. Masters in the production pool in Jay County, Indiana, some years ago.

Rowe and Randall have started a well on the Lidia Bell Thompson farm, adjoining the Dimmick Brothers well on the Ratliff farm in McLean County, and not far from the town of Utica. The outfit was moved from their dry hole on the Maddox farm, same county.

The Oil Well Supply Co. of Pittsburg is the latest entrant in the field for furnishing supplies to oil producers in the various fields out of Owensboro. The Bresler store building, in Frederica Street, near Third, has been leased by L. L. Baldwin of Bridgeport, Ill., manager for the company. This is the sixth supply company to open a branch in Owensboro.

The well drilling on the Mayor Beck farm in Daviess County was dry in the Jett sand and will be drilled deeper in hopes of finding a commercial producer in the Barlow formation.

# MICHIGAN CENTER OF ACTIVITY IN FIELDS OF THE CENTRAL WEST

*Staff Correspondent, Central West Fields*
By Whit

FINDLAY, Ohio, Feb. 27.—There were but five new completions reported in the Central West, one of which was in the old Lima Field of northwestern Ohio and four in Illinois. Indiana and Central Ohio fields failed to report anything but snow. Michigan reports no new wells, but there is quite a little boom on in the vicinity of Muskegon, where the recent well was brought in, causing a rush of operators from the Saginaw Field, which has been an active spot for the past couple of years. Of the five wells reported in the Lima and Illinois fields, one was a gas well, one a dry hole and the other three showed a combined initial of but 44 bbls. Very few wells are drilling in any of the divisions as weather conditions are so changeable the average operator prefers to await the spring season.

In the Lima Field of northwestern Ohio the Lindy Oil Co.'s No. 4 well, in the southeast corner of the John E. Boyer farm, Section 11, Washington Township, Sandusky County, topped the sand at 1,296 feet and found the pay at a total depth of 1,349 feet or 53 feet in the sand, the well producing an initial of 3 bbls. North of Tiffin in Liberty Township, Seneca County, two new wells are starting. J. H. Murphy & Son are drilling No. 3 on the Griffith-Leister farm, Section 20, and the Murray Valley Oil & Gas Co. is working at a test on the Jacob Kimmett farm, Section 28.

In the Elmore Field, in Harris Township, Ottawa County, Gust Magsig & Son are drilling No. 16 on the Charles Magsig farm, Section 20.

In Troy Township, Wood County, north of Woodville, Charles F. Zeising and others are drilling a test on the Jim Briggs farm, Section 17.

### Illinois

W. C. McBride, Inc., drilled a second test 600 feet from the north line and 200 from the east line of the R. E. Deverick farm, in the northwest quarter of Section 1, Johnson Township, Clark County, getting a 2-bbl. pumper at a depth of 570 feet. This concern is making a strong effort to find production not alone in the shallow sand, but also in the Stray sand and in the Niagara Lime. The Trenton Rock exists in the Martinsville Township area of the same county, but seldom is a well drilled to the depth at which it is found, from 2,400 to 2,600 feet, as the production is not large enough to warrant the big expenditure.

John Phipps, well known old time operator, drilled a dry hole in his second attempt, 625 feet from the north line and 200 from the east line of the J. D. Reavill farm, in the northwest quarter of Section 32, Montgomery Township, Crawford County, at a depth of 964 feet. In Oblong Township, same county, the Dinsmoor Oil Co.'s No. 12 well, 200 feet from the south line and 600 from the east line of the F. L. Dewey farm, in the southeast quarter of Section 16, pumped 4 bbls., initial production.

The Silurian Oil Co. drilled its No. 6 on the William Ross farm, Section 29, Petty Township, Lawrence County, from the Kirkwood sand at 1,420 feet to the McCloskey sand at 1,762 feet, the well doing an initial of 35 bbls. from the lower sand. The Ohio Oil Co. abandoned No. 1 on the Jess Douglas farm, Section 13, same township, while the Big Four Oil & Gas Co. abandoned old No. 12 on the L. M. Seed farm, Section 12, Dennison Township, same county.

### Michigan

It is surprising what the completion of a wildcat well means to a community, and how it will bring in the outside scouts and oil men in droves. This is now being experienced at Muskegon, Mich., and many of the former operators in the Saginaw Field are getting set in what looks like the opening of another new field in Michigan; the State that the trade has

(Continued on Page 234)

# What one Oil Man Wrote to Another *about* VICTAULIC COUPLINGS

*THE President of a large oil company wrote to the Vice President of a great oil producing and refining company requesting his opinion of and experience with Victaulic Couplings. Here is the reply received.*

1925

"Our first experience was in 1921, when we tried out Victaulic Couplings on a 4″ water line and we were impressed with the efficiency of this joint. Since that time we have continued and extended the use of this joint and at the present time, we have approximately two hundred miles of field line equipped with Victaulic Couplings. These lines vary from 4″ diameter to 12″ diameter and from two miles to twenty-five miles long.

"We have had these joints in operation for over four years and have found them very satisfactory indeed. We have used these joints on fresh water lines, salt water lines, hot salt water, gasoline, gas, crude oil—in fact for all purposes around a producing field and a refinery. *All our pipe is now ordered with Victaulic Couplings.*

"In the early part of this year we constructed a 12″ gas line to pump residue gas from the compressors in the field to the refinery, a distance of eight miles, and Victaulic Couplings were used in the construction of this line and are giving good service. All our main 10″ gathering system is equipped with Victaulic Couplings carrying a pressure of 200 lbs. and over, and we have had no trouble with these joints. One water line, which is a 10″ line, twenty-five miles long and supplies water to the whole field, working under pressure of 400 lbs., is entirely equipped with Victaulic Couplings. It has been in operation eighteen months and is standing up well.

"Formerly we had to use a large number of expansion bends to allow for expansion and contraction caused by the large differences in temperature during the twenty-four hours, whereas, owing to the flexibility of the lines connected with Victaulic Couplings, we have cut out the use of expansion bends entirely.

"We have subjected our lines to very severe pressure tests and they failed to show any signs of leakage whatever."

1927

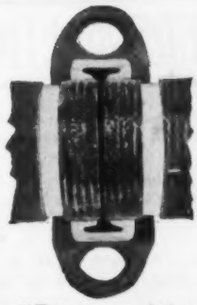
This company has adopted Victaulic Couplings as standard equipment and now has many hundreds of miles of pipe lines equipped with Victaulic Couplings.

VICTAULIC COMPANY OF AMERICA
26 Broadway New York

*Western Distributors*

SMITH SEPARATOR COMPANY
Tulsa Okla.

*For detailed information on Victaulic Couplings for all sizes and kinds of pipe and for all pressures, for typical installations and lists of uses and users, write for Bulletin No. 1.*

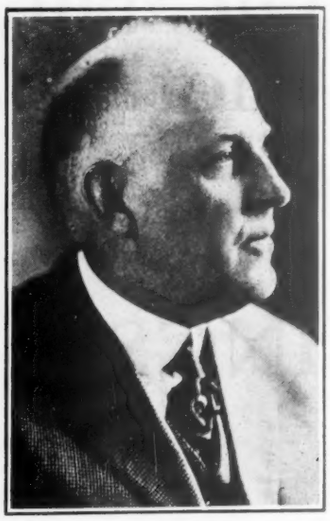


VICTAULIC
REG U S PAT OFF

*The all-purpose pipe coupling* ***Flexible, Leak-proof Pipe Couplings*** *"For every joint on the line"*

FOR CRUDE OIL, GAS, WATER, SEWAGE, COMPRESSED AIR, ETC.

# MEN KNOWN IN OILDOM



**Dorsey A. Lyon**

Dorsey A. Lyon, assistant director of the United States Bureau of Mines, is said to know more mining and metallurgical men than any other individual in the United States. The best part of his career has been taken up by travels from one mining center to another.

Mr. Lyon was born in Bureau County, Illinois, in 1871, and reached the age of 30 before he ever made a trip east of Chicago. His early years were spent in western Kansas where his parents moved soon after he was born.

He was educated at Drury College in Springfield, Mo., and also at Stanford University from which he was graduated in 1898. Following his graduation, Mr. Lyon accepted a position as instructor in the geology of mining at the University of Washington, and when the school of mines of that university was started, he became its first dean. He took postgraduate work at Harvard University where he obtained his master's degree in metallurgy in 1902.

After leaving Harvard he became identified with the U. S. Mining & Smelting Company in Utah. He was an instructor at Stanford University from 1903 to 1908, and conducted experimental work in connection with treatment of iron ores in electric furnaces until 1911, when he went abroad to study the use of the electric furnace in Sweden.

He became metallurgist for the Bureau of Mines in 1912, and was made superintendent of the Seattle Experimental Station of the bureau in January, 1917, and later in the year became supervisor of Mining Experimental Stations. From 1919 to 1923 he served as chief metallurgist, and was then made assistant director of the bureau in charge of research work.

# PERSONAL PARAGRAPHS

A. S. Cochran, Cleveland, Ohio, operator, has invaded the newest Michigan field, in Muskegon.

* * *

R. F. Gibson, Shreveport, La., is representing the Dixie Oil Company in the new field at Muskegon, Mich.

* * *

Charles Shapard, of W. J. Wollman & Company's Tulsa office, has been in the main office at New York.

* * *

J. E. Shaffer, of the J. E. Shaffer Company of Tulsa, manufacturers of the Shaffer gauge cock, will return to Tulsa, March 1, from a sojourn in southern California.

John L. Brock, Jr., oil producer of Okmulgee, Okla., has returned to his home after three weeks spent in Chicago.

* * *

C. H. Jamieson, of Concord, N. H., a director of the Champlin Refining Company, of Enid, Okla., is in Tulsa for a visit.

* * *

Jack Shannon, general manager of the Snowden & McSweeney interests, is back in Fort Worth, Tex., after a trip to Tulsa.

* * *

Jim Hoffman, formerly general superintendent of the T. B. Slick interests, and now an oil producer, visited Tulsa last week.

* * *

Charles Markey, manager of oil country sales for the Link-Belt Company, is making a tour of the Oklahoma territory.

* * *

William Calder, federal petroleum and natural gas inspector, has returned to Calgary after a visit to the United Kingdom.

* * *

F. R. Kenney, vice president in charge of the California operations of the Marland company, is to be transferred to Oklahoma.

* * *

Senator E. Michener, president of Commonwealth Petroleum, Ltd., has returned to Calgary after a visit to California and Montana.

* * *

H. A. Jenkins, sales manager for the Zero Hour Torpedo Company of Tulsa, has returned from a two weeks' trip to West Texas.

* * *

R. L. James, of Los Angeles, Calif., engineer, with the National Gasoline Company of California, was in Shreveport, La., recently.

* * *

George W. Mattison, representing Nordberg Manufacturing Company, Milwaukee, Wis., was a recent visitor in Fort Worth, Tex.

* * *

R. W. Logan, of the Logan Map Company, Fort Worth, Tex., has returned following a two weeks' trip through the entire West Texas area.

* * *

Harold Greenleaf, of the Phillips Petroleum Company, Tulsa, Okla., spent a few hours in Fort Worth, Tex., last week en route to West Texas.

* * *

M. A. Abernathy, superintendent of gas sales for the Magnolia Gas Company, at Latex, Tex., spent several days last week in Beaumont, Tex.

* * *

J. S. Cosden, New York City, is in Fort Worth, Tex., and will be there a few weeks in connection with the Cosden operations in West Texas.

* * *

Ralph W. Loucks, of the Carter Oil Company, with headquarters in Casper, Wyo., has been conferring with company officials in Denver, Colo.

* * *

C. H. Sherman, Fort Collins, Colo., general manager of the Union Oil Company of Nevada, was a recent business visitor in San Angelo, Tex.

* * *

Edward R. Weidlein, director of the Mellon Institute of Industrial Research, has been re-elected president of the American Institute of Chemical Engineers.

* * *

Theron Wasson, chief geologist of the Pure Oil Company, with headquarters in Chicago, Ill., made a recent trip to the Pure company's Fort Worth, Tex., offices.

* * *

H. H. Schwartz, Jr., manager of the Maple Leaf refinery at Coutts, Alberta, has recently completed a business visit to his company's interests in Spokane, Wash.

Edward B. Dana, of Belpre, Ohio, who graduated last year from the University of Pittsburgh, is now employed by the New York Venezuela Gulf Oil Company, and is located at Maracaibo, Venezuela.

* * *

* * *

C. B. Kerns has resigned as chief chemist and superintendent of manufacture of the Galena Signal Oil Company, to assume charge of the development work of the Pennsylvania Lubricating Company, Pittsburgh, Pa.

E. Russell Lloyd, geologist, formerly with the Roxana Petroleum Corporation, at Roswell, N. Mex., has resigned and is engaged in consulting geological work at Denver, Colo.

* * *

W. A. Clark, Jr., geologist, formerly with the Indian Territory Illuminating Oil Company at Bartlesville, Okla., has been transferred to the Delmar Oil Company at San Angelo, Tex.

* * *

William H. Thompson, secretary of the Ohio Gas and Oil Men's Association, of Columbus, Ohio, accompanied by Mrs. Thompson, sailed February 25 for a four weeks' outing in the West Indies.

* * *

A. M. Gee, formerly chief counsel for the Ohio Oil Company in the Rocky Mountain division, is spending a few days in the offices of the company in Casper, Wyo. He is now counsel for the Mid-Kansas Oil Company at Tulsa.

* * *

W. A. Miller, Findlay, Ohio, president of the Illinois Pipe Line Company, and Charles Bonje, Jr., Findlay, vice president, visited Owensboro, Ky., the home of W. F. McCray, superintendent in the Kentucky Field for the company.

* * *

R. A. Smith, Lansing, Mich., state geologist, spent a few days looking over the new well at Muskegon, Mich., and while he would not make any predictions on the future drilling, appeared to be well pleased with the producing well.

* * *

Howard Edwards, of Cincinnati, Ohio, vice president of the Paragon Refining Company, visited the Toledo plant recently. Edward Stokes, vice president of the Latonia, Ky., branch of the Petroleum Refining Company, also of Cincinnati, accompanied Mr. Edwards on the Toledo trip.

* * *

G. M. Vandaveer, superintendent of the pipe line department, Midwest Refining Company, has returned from Craig Colo., where he and L. L. Langworthy and Karl Krusmark were interested in the completion of the Craig-to-Iles pipe line the company recently laid. Mr. Vandaveer has since left for Farmington, N. Mex.

* * *

Sidney H. Keoughan, president of the Continental Oil Company, who has been in a Los Angeles, Calif., hospital for some time, is expected to return to his Denver, Colo., home soon. Mr. Keoughan left Denver in January on a business trip to the Pacific Coast and was striken soon after his arrival in Los Angeles. He underwent two minor operations.

* * *

V. V. McGrew, district sales manager at El Dorado, Ark., for the Frick-Reid Supply Company since the discovery of oil in Arkansas in 1921, has been transferred to Big Spring, Tex., as district sales manager in that territory. He is succeeded by D. H. Connolly who has been attached to the El Dorado establishment since 1922.

* * *

M. E. Diamond has resigned as cashier of the Northern Division of the Continental Oil Company, with headquarters as Casper, Wyo. Mr. Diamond was transferred to the Denver offices but wished to return to his former home in San Francisco. He has lived in the Rocky Mountain region for eight years and has been with the Continental Oil Company for the past five years.

* * *

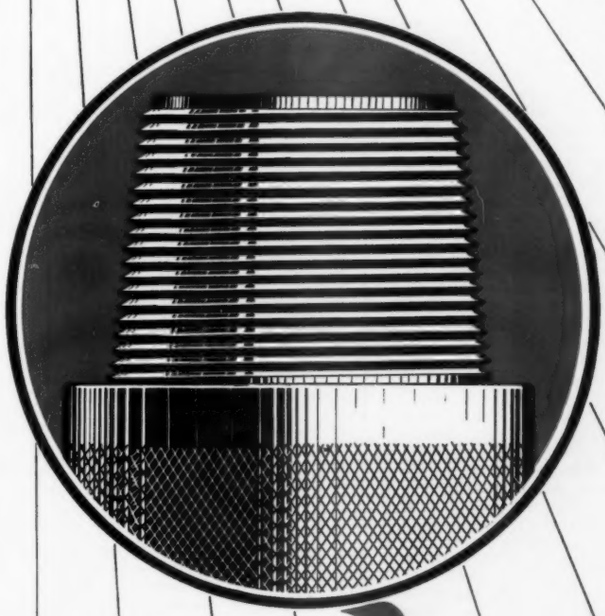
Word has been received in Petrolia, Ontario, of the marriage in Bombay, India, of Miss Merle Neely, youngest daughter of Mr. and Mrs. Ed Neely of Detroit, Mich., to Eric Hussey, eldest son of Mr. and Mrs. W. J. Hussey of Petrolia, Ontario. Mr. Hussey has been on a three-year drilling contract in India, and has signed up for a further two years there.

* * *

Jos. B. Elam, secretary of the Louisiana-Arkansas division of the Mid-Continent Oil and Gas Association, has returned to Shreveport from New Orleans, where, as a member, he attended a meeting of the Democratic State Central Committee. From New Orleans he went to Jackson, Miss., for a conference with the legislative committee of the Mississippi-Alabama Oil and Gas Association and members of a committee of the Mississippi Legislature charged with creation of legislation affecting the oil and gas industry in that State.

Sougher

THE
HUGHES
TOOL JOINT



HUGHES TOOL COMPANY

*Service Plants*
Los Angeles, Calif.
Oklahoma City, Okla.

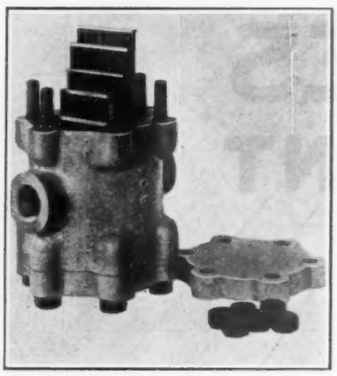
*Main Office and Plant*
HOUSTON
TEXAS

*Export Office*
Woolworth Bldg.
New York City

# EQUIPMENT AND SUPPLIES

## PIPE LINE TRACYFIER NOW IN SMALL SIZES

Using the same principles that have been successful in the tracyfier, this smaller purifier has been developed for



*New pipe line tracyfier.*

use in several sizes of air, steam, or gas lines up to 3-inch.

In saturated steam lines it removes all moisture from the steam, delivering standard specification steam, which is free from all solids, soluble and insoluble. Samples of condensed steam show no more than 9 parts total solids per 1,000,000, which is the tolerance to cover dissolved copper and iron from the test condenser, unavoidable dust contamination during the collection of the sample and its evaporation and unavoidable errors in the laboratory determination of total solids. Standard specification steam is free from all moisture. Throttling calorimeter tests at all times show 100 per cent dry steam, plus or minus not more than .2 of 1 per cent, based on the determined normal of the calorimeter. The permitted variation of plus or minus .2 of 1 per cent is the tolerance for unavoidable variations in radiation and thermodynamic changes.

Many uses are apparent for a "complete-separation" purifier of this size—in steam lines to gas producers to maintain a more uniform hydrogen content in the gas; in the steam lines leading to the tar burners on open-hearth furnaces, where completely dried steam effects a threefold purpose, produces a shorter, hotter, more uniform flame, saves about a gallon of tar per ton of steel, and, most important, keeps the checker chambers cleaner. Placed ahead of laundry or paper driers, the pipe line tracyfier has been found greatly to increase the output of the machines.

These are only a few of the multitude of uses that are being found for this purifier in steam lines. The pipe line tracyfier is made and sold by Andrews-Bradshaw Co., a division of Blaw-Knox Co., Pittsburgh, Pa.

### TO LARGER PLANT

The Young Engine Corp., of Canton, Ohio, announces the removal of its plant from Oil City, Pa., to the new home in Canton. A steady increase in business has necessitated an enlargement of manufacturing facilities which has resulted in the new plant. A service branch will be maintained at the Pearson Machine Shop, Oil City, Pa.

### OPEN OKLAHOMA CITY OFFICE

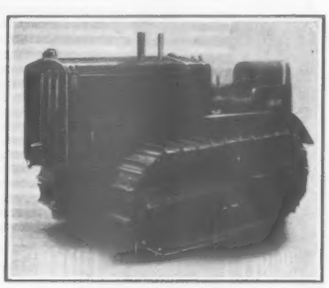
Continental Supply Co. has opened offices in the Petroleum Building, Oklahoma City, Okla., with R. D. Mannix in charge.

### GENERAL ELECTRIC HONORED

Four General Electric Co. men have been named members of the American Committee of the World Congress of Engineers to be held in Tokio, Japan, in November, 1929. They are E. W. Rice, Jr., honorary chairman of the board; Gerard Swope, president; C. C. Chesney, vice president, and Prof. Elihu Thomson, director of the Thomson research laboratory of the company. The appointments were made by Secretary of Commerce Herbert Hoover. This is the first congress of its kind ever held and, according to Baron K. Furuichi, president of the Engineering Society of Japan, is for the purpose of promoting international co-operation in the study of engineering science and problems in all its branches and stimulating a sense of brotherhood among the engineers of the world. The American committee totals 78 members and includes many nationally prominent figures.

## NEW TRACTOR MODEL IS "CATERPILLAR" TWENTY

The Caterpillar Tractor Co., of San Leandro, Calif., and Peoria, Ill., announces a new model tractor, the "Caterpillar 20." It takes its name from the fact that its rating is 20 horsepower at the drawbar. The "20" is built to fit into a line of bigger brothers, the "30" and the "60," as well as the smaller 2-ton, and to supplement these models. Engineers of the Caterpillar Tractor Co. say



*New Mold Caterpillar.*

they spent two years in designing, building and testing the new model under adverse field conditions before putting it into production.

The net weight is approximately 7,000 pounds. Special equipment is provided to meet the individual requirements of owners. The summer top and cab equipment is of the quickly convertible type. The summer top consists of an angle iron frame and curved top over the driver's seat. This is easily converted into a completely closed cab by the addition of sides and doors or curtains.

## WESTINGHOUSE ELECTRIC CHANGES IN PERSONNEL

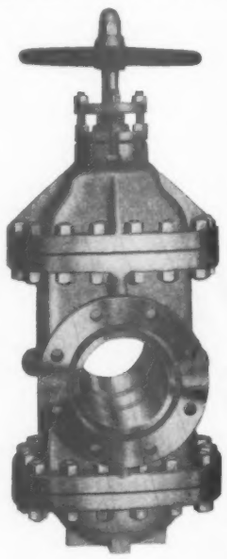
A number of important promotions in personnel, involving executives of the manufacturing organization, have been made recently by the Westinghouse Electric & Manufacturing Co.

Announcement has been made by J. M. Hipple, works manager of the East Pittsburgh Works, of the appointment of E. C. Brandt and F. J. Shiring as assistant work managers, and of J. E. Webster as chief plant engineer.

Changes simultaneously announced by E. R. Norris, general works manager, are the appointment of A. E. Kaiser as director of production for all works and S. C. Hoey as works manager of the Homewood Renewal Parts Works.

## VALVE CAVITY SEALED OFF AGAINST SEDIMENT

A distinct feature of the new Law gate valve, announced by the DeSoto Foundry & Machine Co., Ltd., Mansfield,



*The valve cavity of this Law conduit gate valve is sealed off against the collection of debris.*

La., is a flow-way which, when the valve is in the full open position, is a smooth continuation of the line pipe with the valve cavity sealed off against the collection of debris.

The Law valve operates with handwheel and single stem and uses the movable parts common to all double gate valves, with the addition of a simple rider which, when the valve is in the full-open position, forms a conduit or unbroken flow-way securely locked between the case rings and sealing off the valve cavity. This conduit protects the valve seats or case rings from abrasion and distortion regardless of foreign matter in the fluid. It prevents the deposit of sediment in the valve cavity and provides unobstructed passage for line scrapers or "go-devils." Thus the mechanism is never made inoperative. The valve eliminates mixing or diversion of fluid in transit as in the instance of multiple pipe lines where one unit carries sweet crude and another sour.

An important feature is the fact that the Law valve may be repacked under full line pressure. Valves tested to 2,000 pounds hydrostatic pressure, for working pressures up to 750 pounds per square inch, are now in distribution in 6-inch, 8-inch, and 10-inch sizes.

### DUNLEVY LEAVES CLIMAX

Lorimer Dunlevy has resigned his position as sales manager for the Climax Engineering Co., of Clinton, Iowa, effective March 15, to take on new duties as general sales manager for the O. E. Szekely Co., of Holland, Mich., makers of commercial airplane engines and other products now in process of design.

### ELECTED VICE PRESIDENT

Charles M. Hoffman has been elected vice president of the Dearborn Chemical Co., with headquarters at 310 South Michigan Avenue, Chicago. Mr. Hoffman has been associated with the company since January, 1924, in the capacity of assistant to the vice president.

### RYERSON CHANGES ANNOUNCED

Donald M. Ryerson, vice president and general manager of Joseph T. Ryerson & Son, Inc., Chicago, has been elected chairman of the board of directors, succeeding his father, Edward L. Ryerson, who died January 19, 1928.

Edward L. Ryerson, Jr., vice president in charge of plant operations and several sales divisions, succeeds his brother, Donald Ryerson, as vice president and general manager.

Everett D. Graff has been elected a vice president in charge of purchases. Mr. Graff joined the Ryerson organization upon graduation from college in 1906. After a period in the home office he became Pittsburgh representative, later returning to general sales work at Chicago. In 1916, he was made assistant to the vice president in charge of purchases.

## EMPLOYES ORGANIZE NEW "IDECO" CLUB

The employes of the International Derrick & Equipment Co., at the home office in Columbus, Ohio, have just organized a club whose purpose is to further "Ideco" spirit; promote closer fellowship and for its educational and social benefits.

Through the generosity of Harry M. Runkle, president of the company, plans for assembly rooms were included in those of the new office building just completed. These rooms, occupying the major portion of the basement, consist of billiard and card rooms, a large auditorium equipped with a moving picture outfit, where lectures, educational work, moving picture shows, meetings, dances and other activities may be held; rest rooms and a kitchen. Two evenings a week are to be devoted to educational purposes, and for the present classes in salesmanship and blue print reading are to be given. A series of talks and moving pictures of the steel, oil and other industries has been scheduled.

### BUSINESS NOTES

E. E. Hoffman has joined the sales engineering staff of the Wico Electric Co., of Springfield, Mass., manufacturer of Wico magnetos.

The Brown Instrument Co. has opened a new office in San Francisco, Calif.

The Caterpillar Tractor Co., San Leandro, Calif., has announced price reductions ranging from 8 to 11 per cent. The cuts begin with $175 taken from the price of the smallest model, the 2-ton, to $400 taken from the price of the largest size.

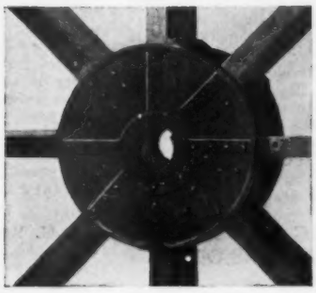
### NEW FOUNDRY COMPANY

The Big Four Foundry Co., Inc., 301 North Hartford Street, with offices at 316 Mid-Continent Building, Tulsa, Okla., has been organized, specializing on high-grade iron and semisteel castings for the oil trade. A. N. Porter, president of the new company, is owner of the Porter Manufacturing & Sales Co., who formerly brokeraged castings, and Clarence Jeffries, formerly of Muskogee, Okla., is to manage the foundry.

### LINCOLN ELECTRIC SALESMAN

The Lincoln Electric Co. announces the appointment of O. D. Fries as salesman in charge of consumer motor business in the Detroit, Mich., territory, under the direction of J. M. Robinson, district manager. Mr. Fries was educated in the Glasgow Royal Technical College and the Glasgow University of Glasgow, Scotland, and since his graduation has had a wide experience in practical and theoretical engineering as well as a wide sales experience.

# MOORE STEEL BAND WHEEL



**Flange Construction**
Rivets hold flange securely. Angle reinforcements give additional strength to spokes. Wheels furnished for all shaft specifications.

THERE is hardly any wear-out to a Moore Band Wheel. Year after year, it stands up under the most severe service. Steel plate rims; rolled steel tug rim; rolled steel channel spokes; heavy cast flanges, riveted on; one-inch face wood cants. Wheels are stocked in 10', 11', 12' diameter sizes with 12", 14" and 15" face. The Moore steel band wheel has strength built in to stay. We are prepared to furnish wheels to A. P. I. Dimensional Standards.

*World Wide Service For Twenty Years*

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CASPER, WYO. SHREVEPORT, LA. EL DORADO, KAN. EL DORADO, ARK.

# Natural Gas Developments

## EXTENSION OF PLANTS IN THE SOUTHWEST

The exhibition of equipment and appliances to be held in conjunction with the annual convention of the Natural Gas Department of the American Gas Association at Dallas, Tex., May 7 to 10, will be one of the largest, if not the largest, ever held by the natural gas industry, according to announcement just made by N. C. McGowen, chairman of the department.

Present indications point to a larger exhibition than was held last year at the Cincinnati meeting, when 22,000 square feet of space were used, says Mr. McGowen. Advance inquiries made by manufacturers regarding space in the exhibit reveal the intense interest being shown.

"All manufacturers of equipment and appliances were especially interested when Dallas was chosen as the meeting place," says Mr. McGowen. "Plant extensions now being made at a record rate in the Southwest will tend to attract the equipment companies, while the intensive building development of the territory is one of the main attractions for the appliance people. It is also expected that manufacturers of industrial equipment will take advantage of the opportunity to exhibt in the center of the Southwest's great natural gas development."

The Exhibition Prospectus has been mailed to manufacturer companies. This prospectus gives the cost of booths, requirements, gas and electricity facilities, and all details. Manufacturers are requested to place their orders for space promptly, to avoid disappointment.

## PREDICTS BIG INCREASE IN NATURAL GAS OUTPUT

The production of natural gas in the United States during 1928 should exceed 1,750,000,000.000 feet, with a valuation of over $400,000,000, according to E. G. Diefenbach, vice president of the G. E. Barrett & Co., Inc., who has just completed a survey of the conditions in that industry. In 1926, he said, the total production of natural gas was 1,313,000,000,000 feet and valued at over $350,000,000.

"The rapid development of the natural gas industry in this country during the past two decades," he added, "can be seen from the fact that in 1906 the total production was only 338,873,932,000 feet. Consumers increased from 884,018 in 1906 to 3,900,000 in 1926."

### MISSISSIPPI GEOLOGY

ABERDEEN, Miss., Feb. 25.—A report on the Paleozoic formations which outcrop in northeastern Mississippi and which is the source of gas produced by two wells in Monroe County, is to be published by the Mississippi Geological Survey as soon as the legislature furnishes the required funds. It is the work of Dr. W. C. Morse, professor of geology at Mississippi A. & M. College at Starkville, and was written as the thesis for his doctor's degree from Massachusetts Institute of Technology. Doctor Morse was formerly one of the Roxana Petroleum Corp.'s geological staff and also of the Empire Gas & Fuel Co., assigned to Kansas territory.

### LINE TO GLENDIVE, MONT.

The proposed gas line from Glendive, Mont., to Williston, N. Dak., is waiting on the coming election in Williston when the people of that place will vote on the matter of giving a franchise to the Montana Dakota Power Co. At the same time the voters will decide whether to sell the Williston municipal electric light plant to the power company.

## GAS MEN TO CONSIDER PROBLEMS OF DISTRIBUTION APRIL 12-13

The annual distribution conference of the American Gas Association and the fifth annual conference will be held at the Hotel Stevens, Chicago, April 12 to 13, inclusive. M. I. Mix, chairman of the distribution committee, has announced a list of topics for discussion at the conference covering every phase of the broad field included in the distribution of gas service, and the program which the committee is preparing will afford the engineers a splendid opportunity for the full and complete discussion of the problems confronting them today.

J. K. Crowell, chairman of the subcommittee on pipe coating and corrosion, will submit a report on the latest developments including progress of committees of the American Petroleum Institute and the Bureau of Standards who are also studying this subject.

O. S. Hagerman has completed the organization of a standing committee on pipe joints that will cover every type of joint for both cast iron, wrought iron and steel pipe. It is expected that the committee will have available for the conference a paper on a welded line of special interest that has just been completed. A paper is also in preparation indicating the experience of the natural gas men on pipe joints in connection with high pressure transmission of gas. Test work in contemplation on cast iron pipe joints may possibly be sufficiently advanced to warrant a report.

#### Portable Equipment

J. H. Braine, of the Brooklyn Union Gas Co., will have available a very comprehensive report on portable distribution equipment. In connection with this M. F. Reeder, of the Peoples Gas Light & Coke Co., will present a brief statement as chairman of the accounting section committee on cost of operating motors and mechanical equipment in distribution work.

Arrangements have been made for a paper on the use of bar connections on meters by E. S. Umstead, of the Providence Gas Co. The general subject of meters—domestic and industrial—will be handled by the subcommittee on this subject, of which George A. Lane, of Chicago, has accepted the chairmanship.

A paper by R. G. Griswold of H. L. Doherty & Co., entitled "Life of Pipe," will be discussed.

The subject of automatic devices for raising pressures at district governors, etc., will probably be treated by E. H. Enander, of the Public Service Co. of Northern Illinois. Long distance high pressure transmission of gas is the subject assigned to F. A. Lydecker, of the Public Service Electric & Gas Co., and chairman of the subcommittee on long distance high pressure transmission of gas. The work of this committee will eventually be contributed as a part of the report of the committee making an economic and engineering survey of the gas industry.

Developments in dehydration of gas will be presented from the distribution engineer's standpoint, and an attempt will be made to cover briefly all that has been accomplished on this very important subject.

There will be an open forum, a feature which has always proved a popular one and members are urged to bring up their problems for discussion.

Arrangements have also been made for a brief progress report and the results of the research in mixed gases at the A. G. A. Laboratory. Saturday morning will be devoted to an inspection trip to the Gary plant of the National Tube Co.

## TOLEDO GAS PROPERTIES FORMALLY TRANSFERRED

TOLEDO, Ohio, Feb. 25.—By March 1 Toledoans will pay their gas bills at the office of the Northwestern Ohio Natural Gas Co. as a result of the sale of gas properties operated in Toledo by the Toledo Edison Co., to the Ohio Fuel Gas Co., of which the Northwestern concern is a unit. The deal has been approved by the Ohio Public Utilities Commission. This will mean that the Edison company will be out of the gas business in Toledo and vicinity.

"The artificial gas business has been a virtual side line for the Toledo Edison Co.," Carroll L. Proctor, vice president of the Toledo Edison Co., said. "Electricity is the business of our concern and we will confine our efforts to this field entirely."

New quarters of the Northwestern Ohio Natural Gas Co., at 231 Huron Street, will be ready for occupancy by March 1. "Both the natural and artificial gas business will be handled in that office," says James W. McMahon, head of the Northwestern company.

### ASK RATE INCREASE IN OHIO

Eighteen communities in Ohio, according to advice from Columbus, Ohio, are mentioned in application of the Logan Gas Co. for an increase in gas rates filed with the Ohio Public Utilities Commission a few days ago. The towns affected are Belleville, Willard, Bellevue, Fremont, Mount Gilead, Galion, Lorain, Marion, Ashland, Butler, Athens, Bucyrus, Laurelville, Cardington, Kingston, Chauncey, Crestline and another town not announced. The rate proposed is $1 for the first 500 feet or fraction thereof; and 63 cents per 1,000 feet thereafter, with a 3-cent discount for payment within 10 days.

### DELAWARE GAS CO. ELECTION

T. C. Jones, of Delaware, Ohio, well known among gas and oil men, was elected president of the Delaware Gas Co., at its stockholders meeting at Delaware. F. P. Hills was chosen as vice president and J. F. Shoub, secretary. The new board of directors consists of T. C. Jones, F. P. Hills, R. E. Hills, J. W. Hills and J. F. Shoub.

### NEW KENTUCKY LINE

The Inland Gas Corp. has awarded contracts for the construction of a main transmission line from its natural gas fields near Prestonburg, Ky., to Ashland, Ky., for the purpose primarily of supplying industrial consumers in that vicinity. Construction will be under the supervision of the Hope Engineering & Supply Co. The line will be ready for operation some time in May.

### GAS FOR FARGO, N. DAK.

GREAT FALLS, Mont., Feb. 25.—The Montana-Dakota Power Co. has filed a petition with the State authorities at Bismark, N. Dak., for a permit to lay a pipe line for gas from the town of Beach, on the Montana-Dakota line, to Fargo. This line is to carry natural gas from the Glendive gas field in Eastern Montana to Fargo, N. Dak., and the intermediate towns along the route. The proposed route will follow the Northern Pacific Railroad.

## GAS LINE TO AUSTIN AHEAD OF SCHEDULE

SAN ANTONIO, Tex., Feb. 25.—Ten days in advance of contract time Southern Gas Utilities, Inc., notified the Austin Gas Co., of Austin, Tex., it was ready to furnish natural gas. Southern contracted to have its 12-inch pipe line built to the city limits of Austin and ready to serve natural gas by March 1. The line was completed on February 20. The Austin Gas Co., the distributing company at Austin, Tex., has been using manufactured gas. The company is owned by G. L. Ohrstrom & Co., of New York.

The Southern company extended its line from New Braunfels, Tex., a distance of 51 miles to Austin. Southern will put in a distributing system at San Marcos which is en route to Austin and will be ready to supply gas to San Marcos by June 1. The lines and distributing systems were completed to New Braunfels and Seguin last December, and the company began supplying New Braunfels on December 11, and Seguin on December 15.

## MANY ARE SERVED GAS WHO ARE UNPROFITABLE

NEW YORK, Feb. 25.—The new form prepared by the Consolidated Gas Co. last summer as the basis for gas charges to large consumers is to be revised because some of these consumers have found that the plan, adopted with an idea that it would not only reduce the cost of gas, but would encourage greater use of it, has not worked to their advantage. The plan was to charge consumers using as much as 100,000 feet of gas a month a rate of about $1.05 instead of $1.15, paid by those using smaller quantities.

William Merrifield, gas engineer of the Public Service Commission, explained that if a customer who usually needed 100,000 feet of gas a month found that for a period he would need less than 50,000 feet he would be paying at the rate of $1.30 per 1,000 feet for it, instead of $1.15, which the gas would cost if the new plan had not been agreed to. Discovering that constantly changing conditions made it difficult if not impossible for its customers to determine just how much gas they would need, the company resolved to alter its plan so that an agreement entered into with the customer could be changed any time the latter desired.

Such an amendment to the original plan, Mr. Merrifield said, would be filed with the Public Service Commission within a few days, thus protecting those who have entered into a contract with the company against their own interests. Mr. Merrifield added:

"The public is not aware that a large proportion of the gas business is unprofitable. There is a vast number of people who are supplied with the facilities for using gas, but who are virtual nonusers. Approximately 50 per cent of the city's gas consumers are served without profit to the company."

### INTERESTING GAS BOOKLET

An especially interesting booklet entitled "Natural Gas," has been published by G. E. Barrett & Co., Inc., 120 Broadway, New York, and distributed through the natural gas industry. It was compiled by the underwriting department of the company which states the booklet is not intended as a textbook nor as an original contribution but rather as a compiliation of previously prepared and published data and information concerning the natural gas industry. The booklet is well illustrated, very attractive and contains articles by well-known authorities in the natural gas industry.

# Going Down the Line Quickly

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Capacity 16" to 24" Pipe 6 to 8 Miles Per Day

Be Sure Your Budget Specifies Smithsteel Gas Line Pipe

# A. O. SMITH Corporation

*Oil Field Products Division,* Milwaukee, Wisconsin

*District Offices at* New York Pittsburgh Tulsa Houston Los Angeles

# Field Problems and Their Solution

EDITED BY THOMAS F. SMILEY

*In order that men connected with the drilling, producing and transporting branches of the petroleum industry may procure quickly a solution of many problems confronting them from time to time in their work, The Oil and Gas Journal has arranged with leading engineers and other recognized authorities to answer questions submitted by readers of this publication pertaining to the work of drilling and producing crude oil and transporting this product.*

*Everyone is invited to submit questions freely. These questions will be submitted to proper authorities by Mr. Smiley, who edits the page, and answers, based on the best available information, will be published. Each question should give as much detail as possible, especially where it relates to matters where depths of sands, types of sands and operations on adjoining properties would have a bearing on the problem involved. The source of all questions will be considered as confidential and only initials will be published in connection with the question.*

*In this connection, The Oil and Gas Journal will be glad to publish articles from field men who have devised new methods or practices which are improvements.*

*In case an immediate answer is important, one will be given by mail if the writer requests it.*

## GAS CREATES PROBLEM

**Where considerable gas is got in the 50-foot and both oil and gas in the 30-foot in the Southwest Pennsylvania Field a well will flow 15 to 30 bbls. at a time through the 6-inch casing, but when tubed with 2-inch there is so much gas with the oil that only 1½ bbls. an hour can be pumped. What is the best procedure?—H. M. T.**

Without additional information concerning your problem it is impossible to say definitely what course you should follow. When oil flows through the casing as indicated in your letter, there is no reason why it should not flow through the tubing if the latter is set at the correct depth. It is possible that the tubing is set too high in your well, which would account for the large volume of gas and also the necessity for pumping. In event that only gas is coming from the 50-foot pay and it is possible to set a packer below the top of the 50-foot pay, much of your trouble from excess gas interfering with the pumping should be eliminated that way.

It is generally considered poor policy to produce from more than one sand in a well or from lime pays separated by "shale breaks." Usually one acts as a thief to the other because of unequal pressures. The pressure in one will be lower than in the other. The pressures tend to equalize and in doing so oil or gas from one stratum will enter the other.

You are advised to write again, giving depth of the well, distance to the top of the 50-foot pay, distance from the top of the 50-foot pay to the top of the 30-foot pay and type of formation between the two pays. Is only gas produced from the 50-foot pay, and if so, what quantity will it produce in 24 hours? Have you any information as to the approximate amount of gas coming with the oil from the 30-foot pay? At what point did you set the tubing with reference to the pays? How often did the well head when flowing through the casing and how many barrels of oil were produced by this method in 24 hours? It is possible that a 24-hour gauge taken in both methods would show a larger production through the tubing.

## FAILS TO GET EXPECTED PRESSURE

**I am operating one 10 by 3½ by 10 Worthington and one 10 by 4½ by 10 National Transit pump. Both are connected to the same suction line, size 8¼-inch. Both are connected into the same discharge which is 8 miles long and has various sizes 3-inch to 8-inch (not telescoped). They are both connected to the same 3-inch steam line, 200 feet long, in which is carried 140 pounds pressure. One pump will discharge 200 barrels at 375 pounds pressure. When you turn the other pump on both will carry only 375 pounds pressure, the first pump of course slowing down. It appeared that both pumps working together should boost the line pressure and discharge more oil, which is not the case.—C. A. K.**

On the face of the data given by you there is no apparent reason why, with both pumps on, the line pressure should not be boosted to about 475 pounds, in accordance with your own expectation. It is suggested that you put a gauge on your steam line close to the pumps and ascertain whether you actually have at that point the 140 pounds pressure that you are counting on. There is ground for suspicion that you will discover you have only about 100 pounds. It is possible also that you have one or both of your pumps packed too tightly. It will be well for you to examine your steam piston and see that the rings are tight. If this throws no light on your problem, write again.

## COST OF NEEDED EQUIPMENT

**I have some property that I am expecting to work over and put gas back in the sand as soon as the price of oil makes it worth while. A lot has been written about measuring all of the gas going into the wells and all that is produced. Now it seems to me that it would cost too much money to buy a lot of high-priced equipment in order to get all of the information that is recommended. Isn't there some way I can go about this work and not have to spend so much money? Of course, I want to get as good results as I can. Can you give me some idea of how I should go about it?—J. B. W.**

Most of the statements about measuring the gas pumped into wells and the gas produced have referred to wells on the gas lifts and not to wells on repressuring. A certain amount of information is desirable in all repressuring projects. However, this information may be obtained with little outlay of money.

All input wells should be equipped with an orifice disk in the gas line so that the volume of gas going into the well may be checked daily or at longer intervals, depending on the performance of the well. A portable meter for taking the differential pressure across the orifice may be bought for about $40. This can be set up in a few minutes and is moved easily. A test can be made in 15 minutes. Ordinary pressure gauges will serve to obtain the well pressures. The gas production from producing wells should be checked in order to ascertain whether the input gas or air is by-passing through the sand.

Information on any particular problem relating to repressuring that you might encounter may be obtained by writing to R. Van A. Mills, United States Bureau of Mines, Bartlesville, Okla.

## BURYING PIPE LINES

**I know that it is common practice to bury oil and gas lines. Is this the best practice to follow in all cases or are there times when it would be just as well or better not to bury a line?—L. A. T.**

As the problems involved in piping oil differ to some extent from those involved in piping gas they will be treated separately. Temperature changes greatly affect the capacity of gas lines, and as temperature changes decrease with depth, a more even flow of gas may be obtained by burying the line. In localities where extreme changes in temperature occur, any moisture present results in water settling in the low places and freezing. Burying the lines overcomes this difficulty to a large extent. Particularly in the main transmission lines the gas is under high pressure, and thus these lines are more apt to develop leaks. When traversing a populous district, damage to property and even loss of life may result from breaks in the line. Burying the lines tends materially to reduce the likelihood of such accidents to property.

As regards oil lines, variations in temperature affect the viscosity of oil, and this change in viscosity affects the quantity of oil which may be pumped through the pipe line. The viscosity may be increased to such an extent that the oil will not flow at all as is the case with Panhandle crude.

When lines are laid on the surface of the ground, temperature changes result in contraction and expansion of the pipe and in some cases these changes are of sufficient extent to result in line breaks. Corrosion may be also more pronounced when the pipe is laid on the ground because of the action of the oxygen in the air coming in contact with certain types of ground water resulting in the formation of acids which attack the pipe and corrode it in a very short time.

In many regions the ground surface is too valuable to permit space to be taken up by any sort of pipe lines. It might be pointed out too that preservatives applied to the pipe will last much longer under ground than when they are subject to the abrasive action of winds blowing sand and grit, which wear off the protective coatings.

In general, unless lines are to be taken up and frequently moved, as for example lease lines during the flush period, and provided temperature changes do not interfere with normal operations, it is always advisable to bury either oil or gas lines.

## CLEANING PERFORATED CASING

**What is the best method for cleaning perforated casing in the well?—F. H. V.**

A method which has been used with success in cleaning the perforations in the production string is to run in a wash pipe equipped with a 4-inch collar on the bottom. A plate is welded on the bottom of the collar and six or eight slots, are cut horizontally just above the plate. These slots should be made about long and wide enough to allow a silver dollar to be slipped through them. Water is then circulated down the inside of the wash pipe, usually 2-inch, and up the outside of the production string. The washing operation should start at the top of the perforations and the wash pipe should be lowered very slowly in order to prevent washing the debris in on top of the 4-inch collar and thus necessitating a fishing job.

Another suggested method is to swab the well. Swabbing tends to create a suction on the inside of the perforated string, thus sucking in material fine enough to pass through the perforations.

## PLUGGING OFF FLUID

**What has been found the most satisfactory method of plugging off fluid in gas wells? In asking this question, I have in mind the matter of protecting the field when a well is abandoned and also those cases where it is desired to protect the upper gas.—E. E. M.**

Cementing a well has been found to be the most satisfactory and permanent method to use in either plugging off water and also in protecting an upper gas sand. Other types of materials are often used as, for example, lead wool and mud fluid or simply mud fluid. The chief objection to mud fluid is—that the mud will settle out, also that water will enter a sand and the fluid level will thus be lowered. Often the fluid level will lower sufficiently to permit the well to blow out from the upper gas horizon. The tubing method has been found to be the most satisfactory for shutting water as the cement can be placed where it will do the most good and under pressure. Lead plugs in conjunction with cementing have been successfully employed in shutting off a high head bottom water.

## TOOL DRESSERS DISAGREE

**My opinion is that the best way to dress a drill bit is to dress it so that the middle extends a little beyond the corners. I find drillers and tool dressers who say it is better to dress one of the corners a little ahead of the other. Now I feel sure that there are fewer broken pins from bits dressed my way. Can you tell me if my way of dressing is best and if it is the best way, why?—R. A.**

Your way of dressing bits is the better way as there is a minimum of shock to the tool joints. Vibration is also best dispelled. The same applies regardless of the type of formation drilled.

## IT PAYS TO PAINT TANKS

**Although the Department of Commerce report by Ludwig Schmidt on "Reduction of Breathing Losses from Vapor-tight Lease Tanks" advocates painting tanks to minimize evaporation, there is at least one big company that doesn't paint its tanks at all, evidently believing that it doesn't pay. This seems to be a case where theory and practice seem to be out of line. Is there any actual proof that painting tanks a light color, or for that matter any color, prevents evaporation sufficiently to pay for the cost?—P. W.**

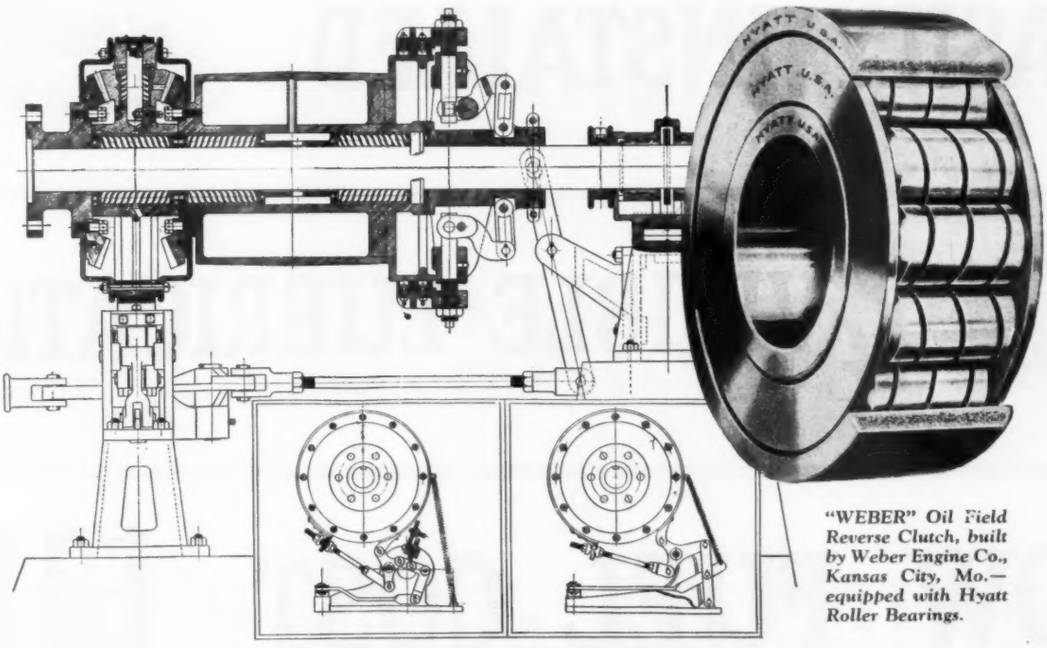
Actual field tests performed by Mr. Schmidt have demonstrated that it does pay to paint the tanks a certain color. Nearly all major companies now paint their storage tanks, most of them with a light-colored paint, as it was found that the evaporation losses in tanks treated with this paint were less than in those painted with a dark color. Aside from the evaporation losses, it is certainly considered good practice to paint tanks in order to prevent corrosion.

## BURNING OFF GREASE

**Is there any objection to burning off the oil or grease that usually covers a new joint of casing or tubing? Unless this grease is removed in some way, the joint seems to creep.—K. L. P.**

There is no mechanical reason why this grease can not be removed provided the heat is not excessive. However, one precaution should be always observed and that is, open fires should not be allowed near the well as there is always danger of igniting gas.

# Still going strong in Weber Oil Drilling Engines




*"WEBER" Oil Field Reverse Clutch, built by Weber Engine Co., Kansas City, Mo.—equipped with Hyatt Roller Bearings.*

HYATT Roller Bearings were the first standard anti-friction bearings used in oil well machinery. Their universally high grade performance, wherever applied, soon made them an overwhelming favorite.

Since their adoption many years ago by the Weber Engine Company, Kansas City, Missouri, Hyatts have been used continuously, with unwavering satisfaction.

Smooth rolling Hyatts are employed to guard against delays caused by bearing breakdowns. They are built to give long, hard service—without repairs or replacements.

With Hyatts, maintenance costs are negligible. These sturdy bearings require very little attention—only fresh lubricant three or four times a year. The helically wound Hyatt rollers keep the oil circulating constantly over every part of the bearing surface.

Consider your bearing equipment as carefully as you consider other investments. Hyattize for safety and permanent freedom from bearing difficulties.

HYATT ROLLER BEARING COMPANY

Newark Detroit Chicago Pittsburgh Oakland

HYATT

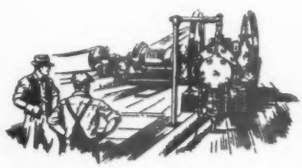
ROLLER BEARINGS

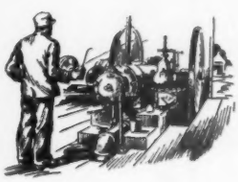
PRODUCT OF GENERAL MOTORS

FRANKLIN VALVELESS

ONE TRUCK TRANSPORTATION

EASILY INSTALLED

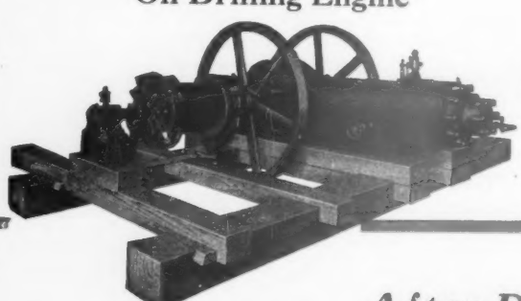




VISIBLE LUBRICATION

LOW FUEL COST

FRANKLIN
Oil Drilling Engine



INTERCHANGEABLE

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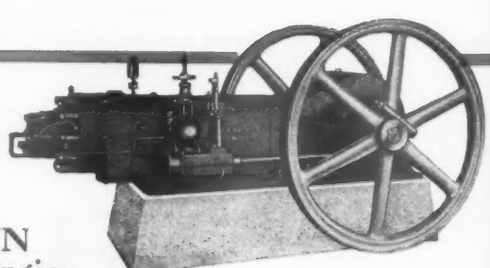

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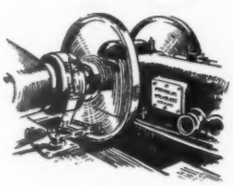

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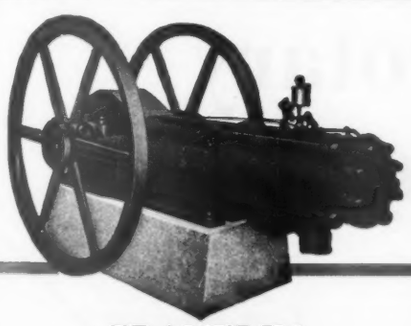

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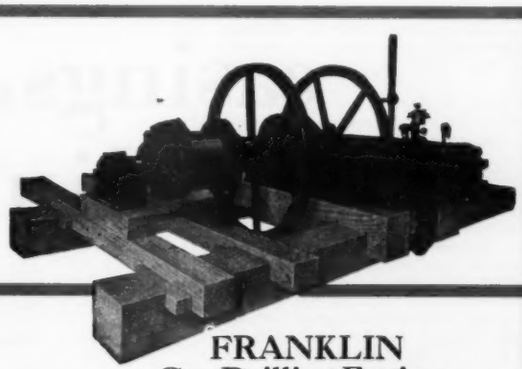

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# New Developments in Air-Gas Lift

## Experience in Mid-Continent Operations Has Done Much to Increase Efficiency of Installations

By C. V. Millikan*

New developments in air-gas lift practices in the Mid-Continent area during the past few months have done much to increase the efficiency of installations, and thus bring within economic limit of air-gas lift many wells which could not have been flowed profitably before. After the gas lift had so thoroughly demonstrated its value in the Seminole Field its use spread to other areas and many installations were made the economy of which could be questioned. In the Seminole area when production began to decline it was necessary either to increase the efficiency of the air or gas lift or to put the wells on the pump, and pumping was not a process of lifting oil to which any operator looked forward with hope. These conditions have resulted in the development of many practices which increase the efficiency and permit wells to be flowed with air or gas which earlier could not have been flowed economically, and wells which have been flowing to continue to a lower rate of production. The practices which have come into more common usage in the Mid-Continent area recently are mostly revivals of and improvements on practices which have been known in air lift work for several years. Many are peculiar to the individual well on which they are used.

### Intermittent Injection

Some interesting results are being obtained in Seminole and other districts by intermittent injection of gas. Gas is introduced during periods of three to five minutes at a rate considerably over that necessary to acquire the production at a steady rate of injection, and is then cut off for a period of 3 to 15 minutes. Two to five wells are run from the same group of compressors. The total volume of gas required is sometimes reduced to as much as one-third of that required when it is introduced at a constant rate, without changing the amount of oil production. The maximum pressure required is usually higher, but the average equal to or lower than that required for constant rate of flow. The effect on the wells is usually an irregular rate of flowing which may cause inconvenience where recycling is practiced. It would seem that this increase in efficiency is due to less slippage when the gas is introduced intermittently than when it is introduced steadily, and is rather opposite to the more commonly held theory that the smaller the bubbles of gas when introduced into the column of fluid the greater the efficiency of the lift.

Intermittent flowing is a method of air or gas lift which has been practiced in some of the shallow fields for many years but is not yet established as a common practice in newer and deeper production. Some small wells have been flowed three to six times a day and the same production obtained as when they were flowed continuously. It has been used some on wells making considerably more fluid, but the practice is not common. Flowing intermittently where recycling is practiced throws an overload on the compressors at each head with an underload between heads, and this in turn causes an uneven volume to be delivered to all wells being flowed from the compressor plant. Were it not for this uneven load, intermittent flowing would probably be used more extensively than it is at the present time, especially on wells making only a few hundred barrels of fluid.

### Intermittent Flowing

Three methods of intermittent flowing are used. One is with tubing arrangement the same as for continuous flowing and another with the tubing set on a packer with perforations above the packer and valve below the perforations. The third is to run two strings of tubing, the larger size being ordinarily 2½ or 3-inch with a valve on the bottom and a smaller size inside. A few joints of larger size are sometimes run on the bottom of the outer string for a volume chamber. The latter two methods have the advantage of keeping high pressures off the sand, although this is not often detrimental except when the pressure is held long enough to force the oil back into the sand instead of up the tubing. When more dependable kickoff valves are available, intermittent flowing will be in more common use.

Holding pressure on the gas trap is becoming a more general practice, especially where the gas is recycled. Most compressors are driven with an engine or motor of sufficient power to run the compressor with atmosphere intake pressure and a discharge pressure much higher than the working pressure of the particular well being flowed. By holding a pressure on the gas trap the gas can be delivered to the compressors at a pressure above atmospheric, and the surplus power utilized by the larger volume delivered. Trap pressure up to 10 pounds does not often affect the production and frequently a much higher pressure can be held. In the deeper wells there is seldom any effect on the working pressure, but in shallow wells it is usually changed to the same amount as the pressure held on the trap, even for 3 to 5 pounds. Even where the flowing pressure is increased when pressure is held on the trap, the small additional power cost may be more than saved by reduction in amount of equipment required, due to the increase in volume delivered by the compressors already installed.

### Use of Instruments

The use of instruments for automatically controlling the volume of air delivered to a well has been considerably abused and as a consequence they are not as popular as they were a few months ago. In a plant which is equipped with a volume controller on each well there is a tendency to use all the controllers, even though a majority of the wells require much less pressure than others. Such a practice not only requires more power but reduces efficiency of the compressor and increases wear on equipment.

The instruments are valuable when used only on wells with approximately the same working pressure, as their use will often allow part of the machinery to be shut down, and then when it is necessary to shut down a compressor for a short time the decrease in volume to any one well may not be so great as to cause it to stop flowing. If conditions should arise making it desirable to flow two wells with different working pressures from the same group of compressors, the volume can be satisfactorily controlled by partially opening a gate or needle valve between their pressure lines. This method has the advantage that the compressor connected direct to the well with the lower pressure does not have to work against the same pressure as that required by the higher pressure well, which is necessary if an automatic control is used. If recycling is practiced and the intake pressure to the compressors very irregular, a needle valve will not give the perfect control obtained by an automatic controller, but does not often vary sufficiently to affect the oil production.

### Graduated Tubing

Graduated tubing is becoming more commonly used throughout the Mid-Continent area. Some companies are using it almost exclusively, except for wells with very large potential production. Straight strings of tubing are still used to a limited extent, but in nearly all cases where wells flowing through straight tubing have been changed to graduated tubing, a material reduction has been obtained in both the pressure and volume required. There is not often any change in production that can be attributed to changing to graduated tubing. Many companies are still flowing through the annular space between the tubing and casing, even for the smaller wells. While such a practice may require a larger volume than flowing through tubing, the pressure is usually lower and the ultimate lifting cost essentially the same, except on wells with small production. Most compressor equipment throughout the fields is designed for much higher pressures than are ordinarily required, and therefore if the volume can be reduced by flowing through tubing, a saving in equipment usually results, even though the efficiency is not changed. Flowing through tubing invariably imposes greater pressure against the sand than flowing through the annular space between the tubing and casing. When flowing through the tubing the friction loss of forcing the gas down through the annular space between the tubing and casing is negligible, and the pressure shown at the casinghead is, for all practical purposes, the pressure at the bottom of the tubing. Where gas is forced down the tubing there is a material friction loss which on a large volume may amount to over 100 pounds. It is sometimes desirable, however, to maintain this higher pressure on the sand to reduce the natural gas. This is practiced in connection with gas lift work in the Panhandle, parts of West Texas, and to a lesser extent in other areas.

Determination of the size of tubing which shall be used in a well, and where graduated strings are used, the amount of each size to be run, are as yet individual problems. They are calculated or estimated in as many different ways as there are different engineers to calculate them. There are, however, certain principles upon which the calculation should be based, and engineers are in general accord on these. More detailed data are being obtained and better understanding of the action taking place in each installation, so that more and more installations are made on egingeering basis rather than by comparison with similar wells.

One company in the Seminole Field is making a practice of flowing up through casing run for this purpose, which permits cleaning out, swabbing or other work to be done on the well without interruption of production. The pressure necessary to hold against the sand is reduced because of less flowing friction through the large pipe, but the casinghead working pressure may be high because of greater friction loss in forcing the gas through the small area between the two strings of casing to the point of injection into the oil column. Another disadvantage is that the point of injection of gas into the oil column cannot be changed. Where tubing is used, it can be lowered as far as necessary to obtain maximum production, which is sometimes several hundred feet above the sand. Placing the tubing below this point will increase the working pressure without increasing the production, and also frequently increases the natural gas-oil ratio.

### Large Flow Strings

Some further work has been done on the use of large flow strings for air-gas lift work[1] and has given some encouraging results. While the volume required is much greater than the more common sizes of flow strings, the pressure can be reduced low enough to use single-stage

(Continued on Page 176)

*Before A.I.M.E., New York meeting. Copyright, 1928, by the American Institute of Mining and Metallurgical Engineers, Inc.

[1]Foran, E. V., Mechanical Installations of Gas Lift, American Institute of Mining Engineers, Petroleum Division, October meeting, 1927, Fort Worth, Tex.

## Economic Significance of Oil Developments in West Texas-

By C. P. WATSON, New York*

1. To January 1, 1928, the Permian Basin has produced a total of 76,753,000 barrels from 45,764 proven acres and 1,168 wells.
2. Estimates of future production from exploited fields are distributed as follows:

| | Bbls. |
|---|---|
| Yates | 250,000,000 |
| Church-McElroy | 180,000,000 |
| Big Lake | 65,000,000 |
| Hendricks | 120,000,000 |
| Miscellaneous | 25,000,000 |
| Total | 640,000,000 |

3. Outlet to primary markets through pipe lines and tank cars for the first half of 1928 will not exceed 310,000 barrels daily with a maximum of 400,000 barrels per day by the end of 1928.
4. Cost of transporting this oil to Texas Gulf ports are 48 to 55 cents through pipe lines and 60 to 68 cents by tank cars.
5. Uniform distribution of sulphur compounds in all products of distillation requiring additional treatment and corrosive properties of crude establish penalty differential of 20 to 30 cents per barrel.
6. Drilling costs vary between $12,000 in the Yates Field and $35,000 in the Hendricks Field.
7. Production expenses in the field for one group of properties have varied between 3 cents per barrel during flowing stages and 10 cents per barrel during pumping stages.
8. Extensions to the Hendricks Field and evidences of a new field north of the Church-McElroy are the most significant developments at present.

*Before A.I.M.E. New York meeting. Copyright, 1928, by American Institute of Mining and Metallurgical Engineers, Inc.

# Automatic Control

WHITE EAGLE OIL AND REFINING COMPANY

GENERAL OFFICES, FEDERAL RESERVE BANK BLDG.
KANSAS CITY, MISSOURI

Casper, Wyoming
August 27, 1927

The Brown Instrument Company
Philadelphia, Pa.

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Gentlemen:

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We will be glad to have you take pictures of these installations for publication in your advertising.

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WHITE EAGLE OIL & REFINING COMPANY

BY _____ Supt.

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Brown Automatic

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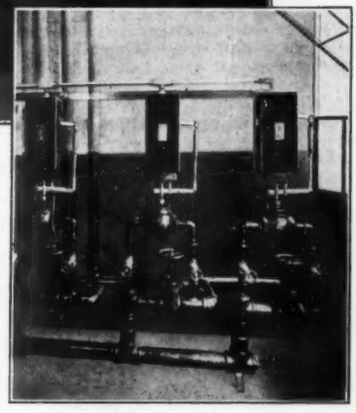
## —the Key Operation in modern refining



*ABOVE—Control board at White Eagle Oil & Refining Co., Casper, Wyo., showing Brown Automatic Control Pyrometers controlling tower operation cracking unit and tube still.*

*RIGHT—Control Valve mechanisms which regulate the flow of cold oil through tower thus governing tower temperature.*

THE success of automatic control equipment in oil refining depends as much upon a sound knowledge of operating conditions and requirements as upon the intrinsic merit of the equipment design. Automatic Control of pipe sills, cracking stills, lubricating units and fractionating towers are problems with which Brown engineers are thoroughly familiar. Write for catalog No. 87 and special information. The Brown Instrument Company, 4456 Wayne Avenue, Philadelphia, Pa.

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# Real Testing Field for Deep Drilling

## Methods Used With Rotary Tools in Ventura Avenue, California, Field, and in the Handling of Heavy Strings of Casing

By H. H. Dievendorff and F. W. Hertel*

The method of drilling deep wells into the earth for the recovery of oil and gas is beset with many hazards. This is especially true in the Ventura Avenue Field which has the distinction of being the hardest field in California in which to complete a deep well. The hard, shifting and squeezing formations must be penetrated to great depths in the face of tremendous gas pressures. The Ventura Avenue Field presents problems that keep the operators abreast with all of the latest developments in oil field tools and machinery and in oil well drilling practices. Equipment must be strong, and adapted to deep well drilling and the handling of long heavy strings of casing. High pressure sands require the utmost care and attention of the operators and no chances can be taken, since a serious blow-out may cause the loss of a well that has cost months of labor and expense. Equipment must meet these requirements or be discarded.

Although the deepest wells in the world are not in this field, nor have the longest strings of casing been set, nevertheless, the consistency with which deep wells are drilled and long strings of casing are set places the Ventura Avenue Field foremost, in this respect, among the oil fields of the world. The Ventura Avenue Field does claim the deepest large commercial oil-producing well in the world, in the Shell Co. of California's No. 18 Edison. This well was drilled 7,015 feet and came in flowing 3,280 bbls. of oil per day. The Ventura Avenue Field also claims the deepest average depth of producing wells in that its 111 producing wells average 5,676 feet in depth. Of these 111 producing wells, 50 are 6,000 feet or deeper, and 16 are 6,500 feet or deeper. Also, of the 111 producing wells 100 are flowing, and 11 are pumping wells.

This paper is intended to set forth the methods used in the drilling of deep wells with rotary tools and the handling of long heavy strings of casing in the Ventura Avenue Field.

### Surface Equipment

Practically all rigs in the Ventura Avenue Field are 122-foot standard heavy galvanized steel derricks with a 24-foot base. A cellar about 20 feet below the derrick floor is dug. This depth of the cellar allows for all the casing connections that are necessary to drill the deep holes. Each derrick leg is reinforced with heavy pipe resting securely on the corner foundations which increases the safe load almost three times. Two of these heavy pipe reinforcements act as standpipes. Each rig has two mud hoses, each hose being attached to a standpipe. The hoses used are 2½-inch diameter and wound with round galvanized wire and tested to 2,000 pounds per square inch.

The pumphouse is on the side of the rig that has the standpipes. The floor of the pumphouse is almost 3 feet lower than the derrick floor, thus insuring a minimum lift of the mud fluid from the slush pit. The pumphouse is equipped with two large mud pumps (14 by 7¼ by 14 inches) with 8-inch suctions and 3-inch discharge lines. These pumps are connected in such a manner that each pump can work independently or may be "compounded." By "compounding" these pumps and reducing the size of the pump liners, a pressure of over 2,000 pounds can be built up. Long settling ditches are built to drop the sand out of the mud. The slush pit is divided into two sections. The ditch pumps into one side and the mud flows over the top of the partition into the adjoining side and is picked up by the slush pumps. This keeps a large amount of sand from remaining in the mud that is being circulated.

The rotary engine commonly used is the 12 by 12-inch twin cylinder steam engine. This large size insures greater power and more flexibility in handling heavy loads. The engine has a splash feed lubrication for the main bearings, crank pins, connecting rod bearings and crossheads, and a force feed lubrication for the cylinders. The rotary engine is supplemented by a single cylinder 12 by 12-inche steam engine which operates the calf wheel, band wheel and sand reel.

The rotary draw works commonly used is the 3-speed, extra heavy type designed for heavy duty. The two types in use have 6½ or 7½-inch drum shafts, and 5⅞ or 7-inch line shafts. The 6½-inch drum shaft has three supports, and the 7½-inch drum shaft has two supports which are roller bearing. Both types of line shafts have the three supports and have plain babbitt bearings. The drums are press forged steel. Most draw works have the automatic cat-head equipment, brake equalizer and a line spooler. The rotaries are the chain-driven, roller-bearing type with 25½ or 27½-inch opening through the table.

The rotary swivels are the extra heavy all-steel roller-bearing type designed for heavy duty. The swivel bail is 3 to 4-inch diameter and equipped wth safety chains attached to the mud hose.

The double extra heavy elevators are used with 2½ or 3-inch by 6-foot links.

The 8-inch wiggle spring hook with the automatic safety latch is used.

Traveling blocks are the 4 or 5-sheave type equipped with roller bearings. The sheaves are made of manganese steel and are usually 30 to 36-inch diameter. The traveling block carries guards on the outside, the newer types being leather faced to prevent wear on the drilling line.

### New Designs Needed

Because of the heavy load that the derrick must support, and consequently the crown block, new designs of crown blocks have come into use. The basic principle of these crown blocks is to have the sheaves in line with the sheaves of the traveling block, either the same diameter as the traveling block sheaves or larger, and to be of the roller-bearing, manganese steel type. The larger roller-bearing sheaves prolong the life of the wire line and insure speed of operation. The new design allows the traveling block to be elevated higher in the derrick than the old-style crown block where the sharp angle of the wire line (spread) limits the height to which the traveling block can be raised.

The drilling lines are 1-inch wire lines and are either 2,000 or 2,500 feet long. The long line is preferred because it is easier to cut off the worn line at the drum, where most of the wear occurs, and spool off new line from the calf wheel, where the reserve is carried, than to replace a new drilling line. The "dead line" is attached to the calf wheel so that in case the draw works or rotary engine break down the drill pipe can be moved by the standard engine to keep it from "freezing" while repairs are being made. It is good practice to have the standard engine turning over slowly while drilling so the pipe can be moved immediately if necessary. The drill pipe has "frozen" in the Ventura Avenue Field when a breakdown of a few minutes' duration has occurred while the pipe was on bottom.

A weight indicator is fastened to the "dead line" just above the calf wheel and the recorded weight is shown on an indicator dial which is placed in a position easily seen by the driller. In drilling at great depths, running long strings of casing, or in fishing for lost tools, the weight indicator shows a relative change in weight much more accurately than the driller can ascertain by standard rotary equipment.

On account of the abundance of gas in the field the power plants consist of 70 or 80 horsepower firebox or tubular boilers with a working pressure of 125 to 175 pounds. The usual program is three boilers per rig.

Because of the sandy nature of the formations in the Ventura Avenue Field, the wells do not make mud while drilling and consequently each lease has a central mud-mixing plant. The great quantity of mud that is used in the drilling of the wells in the Ventura Avenue Field necessitates an abundant supply of mud and in cases of emergency, such as wells attempting to blow out, the mud must be shipped to the well in trouble in large, consistent quantities.

The mud-mixing plant has a large paddle mixer that takes the dry clay, which is hauled from a pit approximately a mile distant, and mixes it into mud fluid weighing 76 to 82 pounds per cubic foot. Steam pumps pick up the mud from large sump holes or large tanks, and pump it to the wells, each well being connected to the mud-mixing plant. Each rig has a return pipe line to the mud-mixing plant so gas-cut mud can be reconditioned. When the wells are drilling into the high pressure oil and gas sands, a tank of surplus mud is kept at each rig.

### Casing Program

The next consideration in the drilling of deep wells is the choosing of a casing program that will meet with water shutoff requirements of the particular field in which the wells are to be drilled and will also keep the hole of sufficient size to allow the well to be drilled to a great depth.

A casing program for deep wells must also take into consideration the fact that in handling long strings of casing they are sometimes stuck before the proper water shutoff point is reached and it may become necessary to land a smaller casing at this point. If the original string is already small, the hole becomes "pointed" and deeper drilling is then very much limited.

The casing program in the Ventura Avenue Field has gradually gone through a process of evolution as commercially productive sands have been found at greater depths, until, at present, the majority of the wells are being drilled with the intention of attaining a depth of at least 6,500 feet.

The usual casing program now in practice calls for a string of 18⅝ or 20-inch stove pipe or screw casing to be cemented at a depth of approximately 650 to 750 feet. This depth is absolutely necessary to case off the running sands and gravels and to insure sufficient depth so that when the surface string is cemented a gas blowout will not occur on the outside of all casings.

Next a string af 11¾ or 13⅜-inch A.P.I. seamless casing is set at a depth of 3,000 to 4,400 feet, depending on the elevation of the wall and its position on the structure, for the primary water shutoff. This primary water string shuts off a large volume of the water. In reality, it serves as a second surface string; otherwise the amount of casing necessary to effect the permanent water shutoff would have too much friction and would "freeze" before reaching the required depth.

The secondary shutoff is made with either 10¾, 9 or 8⅝-inch A.P.I. seamless casing, depending on whether 13⅜ or 11¾-inch A P.I. casing was used for a primary shutoff, and the depth to which it must be carried. The secondary shutoff is made at depths varying from 700 to 1,800 feet below the primary shutoff. Due to edgewater encroachment in the upper sands, it is necessary to set the second water strings on the flanks of the structure considerably lower than in the center field. Due to this fact, in some of the wells now being drilled, it will be necessary to land secondary water strings with over 2,000 feet of friction, which will necessitate landing 9 or 8⅝-inch A.P.I. casing consistently at depths of over 6,000 feet.

The wells are then completed with either 6⅝ or 5¾-inch A.P.I. oil string. the secondary water shutoff generally being reinforced by a combination water shutoff with the oil string. Oil strings with over 2,500 feet of perforated pipe have been successfully landed and clean wells brought in. Wells in which the extent of the oil-bearing zone has not been determined (edge wells) are often brought in with open hole below the secondary water string. This is made possible in the Ventura Avenue Field on account of the hardness of the oil formations, which allow the wells of the open hole to stand up. In case the wells then come in wet, the source of the water entering the hole can be determined and the water shut off. This method will also allow the wells to be later deepened without decreasing the diameter of the hole.

As previously mentioned, water strings are sometimes stuck before the proper cementing place is reached, which necessitates the use of a smaller string of casing at the intended depth. This generally makes it necessary to use 6⅝-inch casing for the secondary water string, and necessitates the use of 4¾ or 3-inch A.P.I. oil string, or bringing in the well in open hole.

The depths at which various-sized casings in the Ventura Avenue Field have been successfully landed might prove interesting as several are probably of world-record caliber:

| Company and Well— | Size Ins. A.P.I. | Weight per Foot, Pounds | Depth, Feet | Total Weight, Tons |
|---|---|---|---|---|
| Shell Oil Co., No. 25 Gosnell | 13⅜ | 61 | 4,321 | 131.8 |
| Petroleum Securities, No. 5 Orten | 11¾ | 54 | 4,359 | 117.7 |
| Associated Oil Co., No. 43 Lloyd | 10¾ | 45 | 3,930 | 88.4 |
| Associated Oil Co., No. 1 Dabney-Lloyd | 9 | 45 | 5,675 | 127.7 |
| Petroleum Securities, No. 3 Willett | 8⅝ | 36 | 6,055 | 109.0 |
| Associated Oil Co., No. 28 Lloyd | 6⅝ | 26 | 6,790 | 88.0 |
| Shell Oil Co., No. 18 Edison | 5⅝ | 20 | 6,997 | 70.0 |

### Drilling Equipment

After choosing a suitable casing program, the drill pipe to be used should be capable of making sufficient hole to set the casing at the required depth.

A square "kelley" (drill stem) about 50 feet long is preferable in drilling the wells because it allows the driller to use the the drill pipe in "doubles" rather than "singles." The "kelley" is equipped with a stop cock so that in case the mud hose blows up the stop cock can be closed until a new mud hose is connected. This will prevent the well coming in out of control through the drill pipe.

A long drill collar (approximately 30 feet) is used on all sizes of drill pipe. This gives additional weight above the bit, and since the twistoffs usually occur

*Field department, Union Oil Co. (California). Before A.I.M.E. New York meeting.
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just above the drill collar, it is easier to fish out.

All fishtail, disc bits and core barrels are faced with hard metal. The hard and sandy formations soon take the cutting edge off the regulation steel bits. By facing the bits with hard metal, the running of the drill pipe in and out of the hole is lessened.

Kammerdiner jars, to fit all sizes of drill pipe, are run on all fishing tools and are run just below the drill collar. In case the "fish" has become stuck in the hole it will then be possible to jar with the drill pipe and loosen. A safety joint is used in conjunction with the Kammerdiner jars so that in case the "fish" cannot be loosened it will be possible to back off the drill pipe at the safety joint and thus leave a minimum amount of additional tools in the hole. The Kammerdiner jars are also used while underreaming and sometimes while coring so that if the underreamer or core barrel become stuck, they may be jarred loose.

The drilling lines are strung through the sheaves of the crown block and the sheaves of the traveling block three times. In other words, drilling is done with six lines. In case the load becomes very heavy, eight lines are strung.

Eight-inch (8⅝-inch A P.I.) 45-pound or 6-inch (6⅝-inch A.P I.) 25.2-pound seamless upset drill pipe is used in making the hole for the 18⅝-inch A.P.I. casing, or the 20-inch stove pipe casing.

Six-inch (6⅝-inch A.P.I.) 25.2-pound seamless upset drill pipe is used in making the hole below the surface casing, to the required depth for the primary water string.

Five-inch (5⅞-inch A.P.I.) 22.2-pound seamless upset drill pipe is used in making the hole for the secondary water shutoff. The greatest depth to which 5-inch drill pipe has been used is 5,886 feet. In case it is necessary to drill below this point to set the secondary water string, 4-inch drill pipe is used.

Four-inch (4½-inch A.P.I.) 16.6-pound seamless upset drill pipe is used in making the hole through 10¾, 9 or 8⅝-inch casing into the oil zone.

In case 6⅝-inch casing has been used for a water string 3-inch (3½-inch A. P.I.) 12.3-pound seamless upset drill pipe is used drilling through it into the oil zone.

Tool joints are used between every two joints of drill pipe, on all sizes, so that the drill pipe may be handled in doubles.

### Drilling and Setting Casing

The drilling of oil wells in the Ventura Avenue Field requires the utmost care. In spudding a well in, great care must be taken to start the hole straight. The reason for so doing is obvious when the great finishing depth is considered. The hole must be kept straight until the surfact casing has been cemented. A 28 or 29-inch stove pipe casing is set about 4 feet below the bottom of the cellar to act as a conductor of mud fluid while drilling.

The wells are spudded in with 25 or 27-inch fishtail bits. The "kelley" is guyed in four directions when spudding in to insure straightness of hole at the surface The 25 or 27-inch hole is drilled to a depth of 650 to 750 feet using fishtail or disc bits. A Wiggins straightreamer is usually run above the bit or just above the drill collar, which tends to center the bit in the hole and keep the hole straight. It also keeps the hole to gauge and eliminates the necessity of reaming before the surface casing is run.

The wells located in the bed of the Ventura River are spudded in with cable tools. The large boulders in the stream channel make it almost impossible to drill a straight hole with rotary tools. It is necessary to drill about 50 feet with cable tools to get past the gravel and boulders, but once past this depth, rotary tools are installed. The cable tool hole is cased with 29-inch stove pipe casing with a steel drive shoe on bottom. The casing is driven down while the cable tool hole is being made, the casing being kept about 3 feet behind the bit.

The 18⅝ or 20-inch casing is now run in the 25 or 27-inch rotary hole. The casing is run through a spider set on top of the rotary table. The bottom of the surface casing is equipped with a steel casing shoe and a cast iron guide. The casing is left about 1 foot off bottom to insure its hanging straight in the hole and is then cemented. Sufficient cement is used to fill the space between the walls of the hole and the casing the entire distance to the surface. In case the cement does not reach the surface, cement is pumped in from the surface through 2-inch line pipe and the remaining distance filled. The cement is allowed to set from two to four days. Due to the cavities encountered in the upper strata, over 2,000 sacks of cement are often used in cementing the surface casing.

The reason for cementing the casing the entire distance to the surface is that in case of drilling into a gas sand before setting another string of casing, the well will not be allowed to blow out on the outside of the conductor casing with the consequent loss of the hole. It is often necessary to drill through this casing as long as four months before reaching the required depth to set the primary water string. In case the surface casing becomes worn out, the cement around the outside will prevent it from collapsing.

The conductor casing is now cut off at the bottom of the cellar. The surface casing, that has just been cemented, is then cut off about 1 foot above the cellar floor and a bottom flange is welded on. A short piece of casing (the same size as has been used as surface casing) is now used for the conductor pipe. This conductor pipe has a companion flange welded on the bottom and a blowout preventer welded on top with a 6-inch mud outlet pipe welded into it just below the blowout preventer. The companion flange is bolted to the bottom flange and the 6-inch mud outlet line is connected to the settling ditch by means of a flange union. The blowout preventer consists of a steel body, rubber packing assembly that will fit either drill pipe or keeley, and a screw lip ring. The drill pipe is packed off by placing a split packing assembly around it and screwing down the lip ring.

### Mud Discharge Line

The mud discharge line is connected to the conductor pipe by a flange union, and is equipped with a high-pressure valve which allows the mud discharge to be run through the mud settling ditch, or through an outside flow assembly. In case the well attempts to blow out, the combination of a blowout preventer around the drill pipe, together with the outside flow assembly, restricts the mud from being discharged from the hole faster than new mud can be pumped down to kill the gas.

After cementing the surface casing and equipping the rig for possible blowouts, the drilling is continued. A 17-14 or 19-inch rotary hole is drilled with 6-inch (6⅝-inch A.P.I.) 25.2-pound drill pipe using disc bits almost entirely, although fishtail bits are occasionally used. A 17¼-inch rotary hole is drilled if 11¾-inch casing is to be used as a primary water string and a 19-inch hole is drilled when 13⅜-inch casing is to serve as the primary water string. The hole is reamed about every 500 feet to keep a full gauge hole. It will therefore be seen that it is necessary to set 20-inch surface casing if 13⅜-inch casing is to be used for the primary water string. This is done to insure the overshot going to bottom in case of a fishing job.

Particular attention is given to the mud when drilling this size hole. If too much sand remains in the mud after running through the setting ditches and setting box, the mud is discarded and new mud is supplied. Sandy mud will not "wall up" the drill hole. Also in case of the drill pipe parting, the sand will drop out of the mud and settle around the tool joints and collars of the pipe remaining in the hole and cause it to "stick." The mud should weigh from 76 to 82 pounds per cubic foot; mud heavier than this retards drilling and lighter mud will cause the walls of the drill hole to cave.

The hole is drilled and reamed to the depth required for the primary water shutoff. The hole is then conditioned for running casing. This consists of discarding all the drilling mud and replacing it with new mud weighing about 78 pounds per cubic foot.

Just before making the last run to bottom with the drill pipe, a new line is spooled on the drum and 10 lines strung through the crown block and traveling block with the "dead line" attached to the calf wheel. The casing can thus be moved by means of the standard engine in case the rotary engine or draw works break down. The stringing of the lines at this time eliminates too much time out of the drill hole before running casing so the mud will still be in good condition.

The drill pipe is removed from the hole and the rotary table set to one side. Two 16-inch by 16-inch timbers are placed crossways to the derrick sills and the casing spider is set on top. These 16 by 16-inch timbers usually have a three-quarters-inch plate of boiler steel on top to prevent the ears of the spider from digging into the wood.

The drilling hook is replaced by a 9-inch wigle hook and the double extra heavy casing elevator is hung on the hook by 3-inch by 6-foot elevator links.

The casing has a steel shoe equipped with a float valve on the bottom and usually a steel collar equipped with a float valve on top of the shoe joint or on top of the second joint from bottom. This float collar is an additional insurance in case the float valve on the casing shoe is broken while running the casing down the hole. The float guide on bottom allows continual circulation on the outside of the casing while running it in the hole.

### Running Casing

The casing is first screwed together by hand with two sets of chain tongs and finished by the casing tongs. The casing tongs are operated by a jerk line from the crank off the band wheel, which in turn is run by the standard engine. All casing collars are tightened by hand with heavy chain tongs before pulling the joints of casing into the rig.

The casing is run to the bottom of the surface string (650 to 750 feet) and the circulating head is placed in the top of the casing and mud is circulated to ascertain if the float valves are operating. At this time a smaller (12-tooth) sprocket replaces the ordinary 18-tooth drilling sprocket on the rotary engine.

The casing is now run to within 300 to 600 feet from bottom, where the float valves are again tested by the circulation of mud. The casing is filled with mud at frequent intervals, while running the casing in the hole, so as not to allow more than 300 to 600 feet of casing to remain at any time. The slip elevator now replaces the regular elevator. This type of elevator removes all weight from the top collar which might be spread due to excessive weight being suspended on the collar and also prevents the threads stripping. In case slip elevators are not used, the top collar is protected as much as possible by screwing a collar protector into it which is not removed until the joint of casing has been landed on the casing slips.

The casing is then "floated" in to bottom. This procedure allows from 300 to 600 feet of casing to be empty of mud fluid while the casing is being run to bottom. This reduces the weight on the elevator.

Sufficient casing is then screwed together to reach bottom and the casing is completely filled with mud. The circulating head is then put on and circulation secured. The reason for filling the casing with mud before putting on the circulating head is to keep a large air pocket from being formed in the mud column. With circulation being secured around the outside, the casing is lowered to bottom. As soon as the casing shoe touches the bottom of the drill hole the pipe is pulled up about 2 feet, thus allowing the casing to hang straight in the hole. Circulation is continued until free.

The casing is now cemented, using 500 to 800 sacks of cement being treated with a quick hardening chemical. During the cementing process, the casing is moved within a 5-foot limit to eliminate channeling of the cement as much as possible. When extremely long and heavy strings are being cemented, the casing is never moved after finding bottom and pulling up sufficiently to allow it to hang straight, as moving heavy strings of casing tend to loosen the collars.

### Water String Packed Off

After all the cement has been pumped down the casing and up around the outside, the valves on the circulating head are closed and the final cementing pressure is maintained on the casing for four days. The water string is now packed off to the surface casing. This is done by substituting the necessary casing assembly in the blowout preventer, which has already been installed on the conductor pipe. A 2-inch opening into the conductor pipe was originally provided and allows an entrance between the two casings. Immediately following the cementing of the water string, the slush pumps are connected with the opening between the casings and heavy mud is forced down behind the water string and into the formation. If sufficient mud can be forced down into the formation in this manner, serious trouble may be eliminated. The water sands will be mudded off and not allow the hydrostatic pressure to be exerted against the casing. The gas sands will be mudded off and prevent a possible blowout between casings, also the gas will not be allowed to "bubble up" through the cement and prevent the cement from setting.

After allowing the casing to stand cemented five days, the conductor pipe is stripped off and the casing is anchored to the bottom flange by means of a landing flange, these two flanges being bolted together. The landing flange reduces the diameter to the size of the next smaller casing. The landing flange is provided with two vents that permit the escape of gas under control between the two strings of casing.

The casing being "landed," the conductor pipe is bolted to the landing flange. The conductor pipe is now reduced in diameter to the same size as the primary water string. While the primary water string is standing cemented the 6-inch drill pipe is taken down and 5-inch drill pipe substituted. A 5-inch "kelley" replaces the 6-inch "kelley."

The hole is bailed to 1,000 feet to test the casing for possible leaks. The casing being found water tight, the cement is drilled out and 5 feet of hole is made ahead of the casing shoe, using a fishtail bit that has had the corners cut off. The regulation fishtail bit has sharp corners that might injure the casing while drilling out the hard cement. The hole is next bailed to 1,500 feet to test the shutoff. Almost invariably, there is a considerable rise in fluid level. This is due to the presence of gas in almost all of the formations and also to the high hydrostatic head of the water sands. The rise in fluid is not taken as conclusive evidence of failure of water shutoff, and bailed samples from top and bottom are tested for salt content and the results compared as the underground water in this field is very salty. As mentioned before, there are water sands present below the primary shutoff and therefore the shutoff test is not treated as a permanent (secondary) shutoff would be.

Having received permission from the State Mining Bureau to continue drilling ahead, a 12⅜ or 10⅝-inch rotary hole is made with 5-inch drill pipe until the correlative depth of the oil zone is reached. This hole is drilled with fishtail and disc bits. Extreme watchfulness is maintained at all times for high-pressure gas sands while making this size hole. The mud must be in good condition at all times.

### Underreaming

In case 13⅜-inch casing has been used for the primary water shutoff and 12⅜-inch hole drilled, it is only necessary to ream the hole with a long fishtail bit as the 9 or 8⅝-inch casing will have sufficient clearance without being underreamed. However, if 11¾-inch casing has been used for the primary shutoff and 10⅝-inch hole drilled, it is necessary to underream the hole to insure 9 or 8⅝-inch casing going to bottom. Un-

(Continued on Page 170)

# The G-R Bentube Section

AN atmospheric cooler that automatically cracks off the scale formed on the outside of the tubes by the pronounced bowing of the tubes on change in temperature.

This scale-shedding action keeps the scale from building up to a thickness that will reduce the heat transfer rates below those for which the cooler is designed.

These sections are standard and interchangeable, provide for expansion, drainage and easy cleaning, are easily moved to new locations, and can be added to as desired for increase in capacity or greater cooling effect.

The many advantages of the G-R Bentube Section—its exclusive scale-shedding feature, interchangeability, long life, flexible capacity and high salvage value, make it well worth your further investigation.

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# 16 more Worthington Centrifugals
## *for Magnolia Pipe Line Company*

IN December, 1926, three motor-driven, Worthington Centrifugal Pipe Line Pumps were placed in service at the Westbury, Texas, booster station of the Magnolia Pipe Line Company's Hull-to-Beaumont Line.

Magnolia engineers were so pleased with the performance of these pumps that 16 more Worthington Centrifugals have been installed and are now in regular operation.

These motor-driven centrifugal pumps occupy minimum space, can be housed in small inexpensive buildings and can be readily transported to another locality if necessary. When used for booster service, storage or receiving tanks are not required, as the pumps are cut directly into the line. Another money-saving advantage is the automatic control of the pump motors by means of pressure regulators, thus reducing attendance required to a minimum.

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# How To Get More Gallonage

By W. T. ANDERSON

The oil industry is looking for new markets for its products.

But the suggestion is offered that it is very far from having exhausted the possibilities of the markets it already has.

Individual companies are spending millions advertising the superiority of their products in qualities that seem identical to the general motorist or so much alike that he cannot distinguish the difference.

The effect, if there is any, is merely to cause a shifting from one brand to another without adding a gallon to the consumptive demand.

The same money spent in an effort to enlarge the demand for gasoline by alluring motorists to greater use of their cars would do the entire industry a whole lot more good.

The railroads and the steamship companies and the summer and winter resorts have shown how it can be done. Their first aim is to create the desire for travel. Once that is aroused their return is assured.

This is the psychology of modern advertising which has become one of the main factors in our marvelous prosperity.

"Eat an apple a day to keep the doctor away" has sold more apples than all the window signs in all the grocery stores.

The Adonis in the new style of collar, the college youths in the fashionplate suits, the ethereal persons exploiting the feminine mode of tomorrow in dress, millinery, hose or shoes, the "Your Home Should Come First" interiors, the spring seed catalogues with their enormous roses and velvety lawns, and last but not least the luxurious coloring which makes a "flivver" look like a Rolls-Royce, are one and all designed to awaken in the beholder the wish of possession or emulation.

People will tell you they get more enjoyment out of the advertising pages of the higher-class magazines than in the reading matter itself. And they do, because the pictures awaken new desires, give them new ideas, new hopes, new wants that demand to be satisfied.

Suppose these advertisers had stuck to the old style of simply stating quality and price leaving the reader to judge, if interested in what they had to offer, their appeal would have been limited to those only who had already decided to buy. Demand would have been that much less. There would have been that much less manufactured and sold and that much less work and prosperity all around.

No wonder that modern advertising by creating desire and enlarging demand has built up printing and publishing to be the fifth largest industry in the United States with an output valued at $2,482,000,000 a year. It has been well worth it in the impetus it has given to all kinds of business and industry, and in the higher standard of living it has encouraged among the American people.

It is true that the manufacturers of gasoline have not been untouched by the spell of modern advertising. Many have begun to color their products so that we can now have gasoline to match almost any car except black. But motorists will not buy an extra gallon for the color.

What is needed is advertising that will lure the motorist out on the road and entice him to take trips that will give him greater enjoyment and incidentally consume more gasoline and lubricating oil.

The railroads do it, the steamship lines do it and the summer and winter resorts thrive on it. Why not the gasoline industry?

We have a product that, compared with the railroad, is a veritable magic carpet. Show the motorist somewhere to go and convince him he should go there and gasoline will take him.

The railroads attract hundreds of thousands by inviting descriptions of the scenery along the route and at the end of the journey. The automobile will take the whole family there as comfortably and more cheaply. In addition, when they get there the car will be ready to take them on side trips where the railroad does not go.

Many a week-end tripper or vacationist has had his or her trip spoiled by not having the car when they got there. Renting a car or climbing on a bus is a poor substitute for your own car whose schedule is what you make it.

Some of the railroads have stars on their schedules and signs along the right of way telling of interesting or historical places to see, with stopover privileges granted in the hope of encouraging farther travel. The family that makes the trip in its own car should be as fully informed of the advantages of every highway and byway.

In the early days of automobiling hotel accommodation along the few highways lacked practically every feature of comfort and convenience nearly all now possess. Since the federal, state and local governments have taken to spending a billion dollars a year on good roads even small towns now have hotels that would have been the pride of large cities before the auto came.

The gasoline and automotive industries have furnished the taxes for these roads and their wider use will repay the investment.

Even from the motorist's own standpoint the time is here when he must perforce take more to the highways if he is to enjoy his car. Congestion in the streets has already reached the point where driving around town is anything but a pleasure. Even the highways immediately adjacent to the towns are too crowded for enjoyment.

To regain the old delight of motoring one must take to the roads, and so widespread has highway improvement become that there are now thousands of miles of good roads off the main highways waiting for discovery.

Incidentally, the oil industry in the form of gasoline taxes will pay $300,000,000 toward the further improvement of these highways in 1928. Not only main highways are being built but improved lateral roads now connect to thousands of points never be-

fore accessible to the automobile owner who will use them if they are called to his attention.

Here is the opportunity for the oil industry to advertise profitably by inspiring the desire to visit interesting or beautiful places, to see unfamiliar scenery and to get the full measure of enjoyment out of one's car.

A campaign of national advertising could be financed by a contribution of a cent a barrel on the gasoline produced which would create a fund of over $3,000,000. Just one-forty-second of a cent a gallon. Even half a cent a barrel would develop the possibilities of such a campaign so that there could be no question of its expansion and continuance.

Aside from the national phase the advantages of local advertising of that nature in encouraging larger use of gasoline in week-end trips to nearby points and more frequent use of the car on the roads during the week are self-evident.

How often do you hear car owners asking one another about the roads between points in the same state, how to get there and the kind and condition of the highways. Effective gasoline advertising could give them this information, keeping them informed, and at the same time offering suggestions and inducements to use the roads more.

As a definite suggestion how this plan might be worked out, let the major companies in a community get together on a co-operative advertising plan. Let them, say, on Thursdays and Fridays through the newspapers and other forms of advertising direct attention to the points of interest in their area which can be reached in a week-end trip, and explain to automobile owners the conditions of the roads and just what routes to follow.

It is not impracticable to estimate that road and route advertising, picturing the charm of travel and the interest of noteworthy journeys could so allure the motoring public as to increase the annual consumption of gasoline by 10 per cent.

That would equal the present annual increase in consumption and therefore double it, calling for 35,000,000 barrels additional gasoline or 1,500,000,000 gallons.

To supply that increased consumption would require 85,000.000 barrels of crude, a contribution to the solution of our present overproduction that would be well worth the effort of the whole industry.

# Outlook as Viewed by Association Heads

## Extreme Necessity for Caution In Manufacturing Policies

By P. M. MISKEL
*President, Western Petroleum Refiners Association.*

***A long-range view of probable development within the refining industry during the present year appears to emphasize the extreme necessity for caution in manufacturing policies and the desirability of arranging affairs in such a way that these policies provide for the degree of elasticity in the volume that will prove sufficient for emergencies that may develop.***

***Another thing of equal importance, in my opinion, is the necessity for conservatism in both our opinions with respect to the consuming ability of the markets for various products, and conservatism in our attitude towards means of distribution. The unquestionably unwarranted expansion in both ability to manufacture and facilities for distribution have for years developed a degree of competition that has taken heavy toll from the prosperity to which refining and marketing, as an industry, is entitled, and just as truly all prospects for the present year will be influenced by the attitude adopted towards factors that have proven so important in the past.***

***Refiners will pay close attention to trends in both consumers' demand for different products and consumers' demand for different qualities of the same general product. At the present time considerable thought is being devoted to the development of new uses for petroleum. New markets may therefore be created, while even the older or established markets are always under process of continuous change..***

***Alteration in the relationship of demand for various products in***

*(Continued on Page 96)*

## Thinking Along Sounder Lines Can Bring Industry to Stability

By E. M. LYONS
*President, National Petroleum Association.*

***The oil industry has been going through one of its most difficult periods. It is suffering from the disease called "excess." This is really a group of diseases—too hopeful investors, too easy credit, too much optimism, too great ambitions, too rapid expansion, too many units, too much production, too low prices. There are other excesses that I could name, but it is unnecessary. We all know them.***

***There are two possible ways to cure such a disease. One is to do nothing. Just let enough time pass by—inevitable economic law will do its work. The mortality will be great, but what of it? The fittest will survive.***

***The other way is to find the cause of the disease and to apply an intelligent remedy.***

***The cause of the most acute disease in the group—too much production—is the mad, disorderly, competitive scramble to drill up a new pool, regardless of whether the oil is needed and regardless of the fact that such a drilling of that pool may turn the whole industry from a condition of comparative prosperity to one of prolonged and devastating financial distress.***

***The industry has experienced such a calamity—not once, but often—what is more, it has seen the condition brought about, not by irresponsible wildcatters, but by major units of the industry, companies with great interests at stake, representing investments of millions of dollars by a multitude of investors. Some of this excessive drilling of new pools has gone on at a time when the United States Government was cordially and repeatedly advising the indus-***

*(Continued on Page 196)*

# "No criticism can be made!"

## —Field engineer boasts of Webers No. 48 Insulating Cement

IT IS also your privilege to be able to test Webers No. 48 Insulating Cement free of charge or obligation. Test its superiority over other cements as well as over sectional or built-up coverings.

Webers No. 48 will adhere to extremely hot surfaces and is, to the best of our knowledge, the only insulating cement which possesses this merit.

You will find it easy to apply, efficient, economical, as well as durable.

Webers No. 48 Insulating Cement was developed and perfected especially for use in oil refineries and power plants where high temperatures are encountered.

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### *A Few Words of Praise*

*Names and addresses will be furnished on request.*

***Memorandum on Report of Chief Engineer of Steamboat, December 10, 1927***

WEBERS 48 Pipe Covering is the thing on pipes in cold weather.

Pipe lines with two coats on will not freeze when cooled down to clean boilers, even where they pass through deck rooms.

There are no joints in this covering; it will not crack; a pipe line is sealed perfectly when covered with it, and by adding a little cement to the last coat, water will not injure it and rats cannot destroy it.

"The largest still ever built is now in service in the Mid-Continent oil field—perfectly insulated with 3½" thickness Weber's No. 48 Insulating Cement."

***A Cleveland Engineer Says:***

"We have used Weber's Cement in the boxes of the Boiler Walls as well as along the side walls in two different boilers. We find upon tearing the firebrick out that Weber's Cement adheres to the common brick on the outside and we can go ahead without replacing the insulation as is the case nine times out of ten with other insulating materials."

***Erection Sup't of One of the Largest Manufacturers of Power Plant Equipment***

"It enables us to reduce air infiltration to a minimum which is one of our chief reasons for using it (Weber's No. 48 Insulating Cement)."

***Field Engineer of Large Engineering and Construction Company in Power Field***

"No criticism can be made of this material, and it is regarded as superior to anything else which we know of."

INSULATING PRODUCTS COMPANY, 1553 West Madison St., Chicago

Gentlemen:

Please send without any obligation on my part, sample bag of Weber's No. 48 Insulating Cement and valuable Booklet on Insulation.

Name .....

Company .....

Address .....

City .....

State .....

# Survey of Sources of Motor Fuels

## Gasoline or Its Equivalent Obtainable From Crude, Shale and Coal Assure Supply. Available Supplementary Sources.

By Frank A. Howard and Robert T. Haslam*
*Standard Development Co.*

In a broad sense automotive fuel is simply fuel in general and includes coal, coke, wood, charcoal and gas, in addition to the full range of liquid combustibles. All of these are actually used, or have been used, commercially to some extent as fuel for automotive vehicles. The steam lorry burning coal and coke is a common sight on the roads of England. The fact that these coal-fired steam lorries have a distinct advantage in taxes over the conventional gasoline-driven lorry probably explains the survival of this vehicle. The omnibus, or charabanc, operated by city gas carried in a balloon container on the roof, was also at one time a common sight in England, although not as common as the ubiquitous steam lorry. These gas-operated vehicles have, however, disappeared from the streets in recent years, and probably owed their existence entirely to war conditions.

In France one of the largest motor vehicle manufacturers had last year more than 30 trucks equipped with regular gasoline engines in service in the Parisian area operating on producer gas obtained from a small gas producer mounted on the running board of the truck. Both wood and charcoal have been used in these gas producers. The authors were interested enough in this unique commercial development to spend some some time examining the apparatus used and inquiring into the success which it had met. The picture is by no means an impossible one purely from the standpoint of practicability, but there is no doubt of the soundness of the conclusion that this is not a development which has any present important significance.

Powdered carbonaceous matter, coal, coke or lignite, has been used experimentally in special forms of internal combustion engines, but so far as is known, these have never been applied to automotive practice.

### Liquid Combustibles

In the field of liquid combustibles the full range has been exploited to some extent. Heavy residual fuel oils from petroleum have been handled both with preliminary vaporization or even gasification, and injected cold in engines specially designed for this service. The intermediate distillate oils of the grade of kerosene and gas oil are in continuous use here and there under special conditions, both in direct injection engines and in carbureting engines. There has even been in South Africa and perhaps elsewhere some experimental use of cheap vegetable oils, and in Europe there are reports, not known to be reliable, of the experimental use of fish oil. In the United States the Hvid engine, which is capable of direct application at least for tractor automotive work, has been run as a stunt on butter fat and on animal oils.

Ethyl alcohol has had rather extensive use as a fuel for regular carbureting type automotive engines in various corners of the world, and a persistent attempt was made in the United States some years ago to exploit this fuel in admixture with gasoline and benzol. Methyl and isopropyl alcohols have been used, at least experimentally.

The achives of the patent offices of the world disclose proposed automotive fuels specifying singly or in combinations, a wide range of synthetic organic combustible liquids, and some of these, such as ethyl ether, are recognized blending agents for special service. Ethyl ether and ethyl alcohol is a combination which has received much attention; the principal function of the ether here being to compensate for the low vapor pressure of the alcohol, which renders starting difficult. Pure cyclohexane has been used as a reference fuel for high compression engine investigation and tetrahydronaphthalene occupied the headline space in the German technical press for a long period some years ago, being held out as a promising substitute for gasoline.

### Electricity

It must, therefore, be recognized that automotive transportation has been shown to be capable of utilizing practically every common fuel, either through the intermediary of the steam boiler or directly in the internal combustion engine. It must not be overlooked that the storage battery-driven electric motor vehicle, which at one time was a serious contender, remains in the picture as a dependable, commercial, self-supporting competitor of the gasoline-driven vehicle in certain classes of service. Through the electric route the door to automotive fuel opens wide to admit even the power of the waterfall.

The principal value of this survey of the broad field of automotive fuels is to bring home the truth which the whole engineering world accepts in its sober moments but forgets at regular intervals, that the automotive fuel question is not a question of the feasibility of manufacturing a certain type of fuel at a low cost or even the fesibility of using this fuel in a practical manner in some type of automotive vehicle.

### The Carbureting Engine

There is only one type of automotive vehicle which is known to be capable of providing automotive transportation of the kind which has built up this industry to its present status, i. e., the vehicle propelled by a reciprocating internal combustion engine of the carbureting type. By a carbureting engine we mean one in which the charge at the time of ignition consists of carbureted air. A fuel which is incapable of use in such an engine is not an automotive fuel from any present practical standpoint. It is possible to go one step further and say that, as of the present day, the fuel must be sufficiently volatile to permit the carburetion process to be carried out by substantially instantaneous vaporization in air at moderate temperatures

### Cost of Automotive Power

The cost of automotive power is made up of three main items: (1) original cost of the engine; (2) maintenance and depreciation charges on the engine; (3) cost of fuel. The sphere of usefulness of automotive transportation is fixed by the total cost of the motive power, not by the cost of fuel alone. This explains why gasoline is, statistically speaking, the sole automotive fuel, while kerosene, a cheaper product of equally great potentialities from the supply standpoint, of higher heat value, and even of fair volatility, is of no economic significance whatever at the present time. The best engines yet devised to handle kerosene as automotive power units are etiher lacking in essential elements of convenience or performance, or if modified to overcome these difficulties, are too heavy, too complex, and too high in fixed and maintenance charges to compete with the existing standard combination of gasoline fuel in a gasoline engine.

### Sources of Automotive Fuel

We are at length, therefore, arrived at the real starting point for an analysis of the sources of automotive fuel. While all combustible liquids capable of use in carbureting engines are thoroughly practical automotive fuels, gasoline, or its equivalent, is the only one which will suit the existing type of engine. Only the combination of gasoline and a gasoline engine now gives a final net cost for the kind of motive power which is demanded by the public, at a figure low enough to support the industry. In arriving at this limiting cost figure, it is literally true that within wide limits the per gallon price of the fuel is relatively unimportant. In considering this last statement it should be remembered that transportation and marketing costs, which are almost independent of the base price of gasoline, amount in the aggregate to something of the order of 10 cents per gallon. It is believed to be true that gasoline or its equivalent must remain practically the sole source of automotive fuel, up to a base price level at least three times and perhaps four to five times its present base price. For example, the average base price of gasoline in the United States at the present time is in the neighborhood of 7½ cents per gallon at the refinery. A base price level of 22 cents would in itself probably make little change in the fundamental situation.

To the extent that this premise is correct, the conclusion must be that gasoline, or its equivalent will constitute the only source of supply for automotive fuels until the automotive world is able to produce a generally satisfactory power unit of characteristics differing from those which have now been accepted as standard for nearly 30 years. We therefore accept the terms gasoline and motor fuel as synonyomous for present practical purposes.

The primary sources of gasoline are (1) crude petroleum, (2) shale, (3) coal, via hydrogenation. The supplementary sources are (1) natural gas, (2) coal, via distillation or gasification, (3) carbohydrates.

The sources listed as primary sources are each known to be capable of meeting the demand. The sources listed as supplementary are so classified because this seems to be their true economic function and present limit of possibilities, both from a quantitative and qualitiative standpoint.

The present general status with regard to each of these sources is as follows:

### Crude Petroleum

Crude petroleum is now produced in greater quantities than at any time in the past, and in fact in excess of current demand. Substantial quantities of crude oil production are shut in. Known crude oil reserves are greater in the aggregate than ever before. Geophysical methods of exploration now supplement surface geology and core drilling studies for the location of territory promising for the drill. The whole technique of oil production is improving. Foreign sources of supply are showing increasing ability to relieve the United States of the burden of supplying the world's requirements, which it has carried in times past with relatively little assistance. The American Petroleum Institute has officially endorsed, through resolution of its directors, development of the domestic heating market for petroleum, thus implicitly declaring its faith in the ability of the oil industry to carry any increased burden which this expansion may throw upon it, without endangering motor fuel supplies. The technique of cracking operations by which

(Continued on Page 162)

*Before A.I.M.E. New York meeting. Copyright, 1928, by the American Institute of Mining and Metallurgical Engineers, Inc.

## Urges Policy of Stable Markets At Reasonable Prices as Aim

By HENRY M. DAWES
*President, The Pure Oil Co.*

*There seems to be pretty general agreement that the trouble with the oil business at present is overproduction. The first instinct is to think of this overproduction as being entirely due to the increased supply of crude oil. All the attention in the world has been directed towards this problem and progress is being made in the direction of correcting, as far as is humanly possible, the irregular rate at which oil is produced. It is not necessary to point out the physical difficulties which can never be eliminated, but it is perhaps as well to keep in mind that over a long period there has never been any real overproduction, and that the problem is really one of arriving at a reasonably regular rate of production.*

*The operations of refining and marketing are suffering from an overdevelopment just as definitely as is the case in the production of crude. This unfortunate situation is apparently largely the result of overkeen and destructive competition. We have to face the fact that the industry has over-built, both in refineries and in service stations, and it has done so without the incentive of compelling physical conditions that have prevailed in the production of crude. As an*

(Continued on Page 96)

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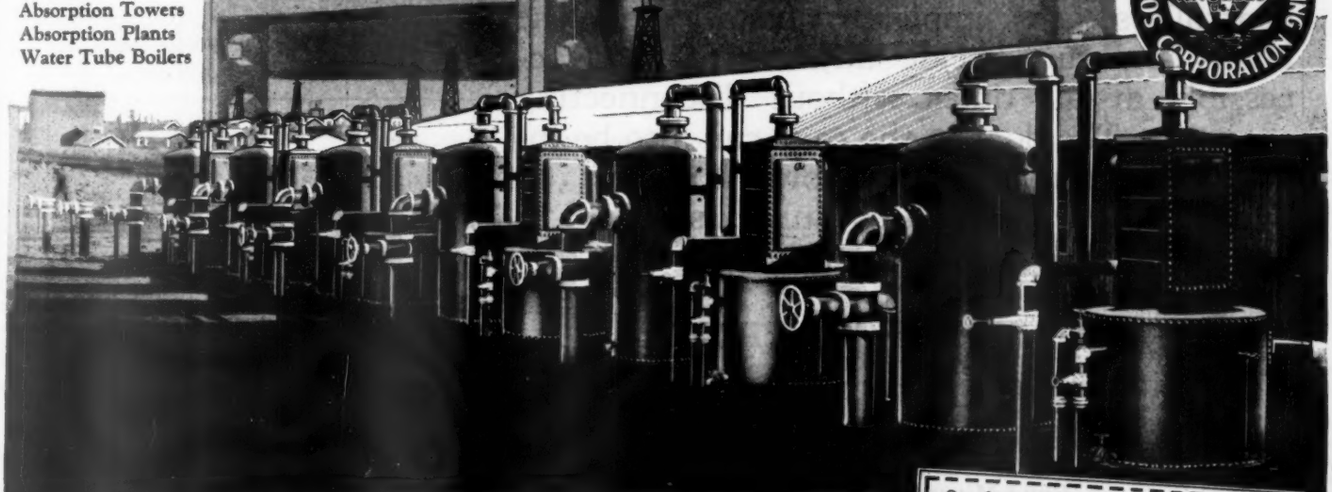

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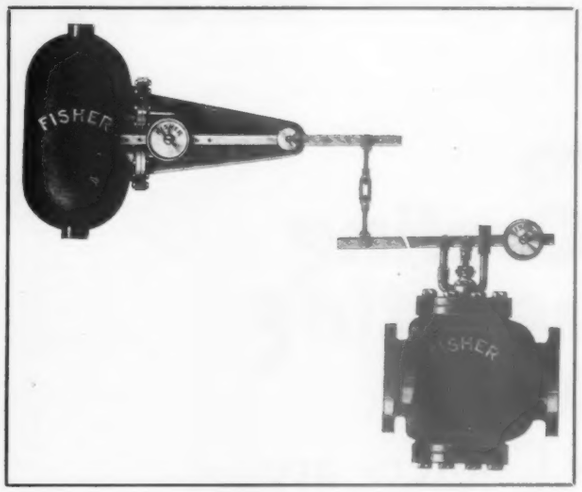


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# Trend Toward Larger Refinery Units

## Annual Survey Shows Decrease in Number of Operating Plants Although Total Capacity Greater. Cracking Expands

By C. O. Willson

The past year in petroleum refining in United States marked a continuance of a trend toward fewer and larger operating units, a development which has been apparent for the past four years. This conclusion is based on the data obtained by The Oil and Gas Journal in its 1928 survey of refining, which is published complete in this issue.

The survey, which was completed during the past week, shows that at the present time there are 456 refineries of all types with a daily rated capacity sufficient to handle 3,428,830 bbls. of crude oil. The operating refineries totaled 312, which have a rated capacity of 3,115,580 bbls. daily. The list of operating plants include four under construction, which will be completed and ready to start operating within a few weeks.

The shut-down plants totaled 144, and these had a rated capacity of 313,250 bbls. daily. Of the operating plants, 148 have cracking units with a capacity to handle 1,327,584 bbls. of cracking stock daily.

The significance of these data covering present-day operations is apparent when comparison is made with the same reports for previous years. As shown in Table 1, there was a decrease of six in the total number of refineries, although the capacity of 1928 plants is greater by 184,523 bbls. daily.

Among the operating plants there was a decrease of 14 in the number of refineries, with an increase of 151,153 bbls. daily in the crude oil capacity. This trend toward fewer but larger refineries started in 1926, when there was a decrease of 29 in the number of operating refineries compared to the 385 refineries of 1925, the largest number of operating units in the history of the refining industry. Compared with this 1925 figure, there are now 73 fewer operating plants, although the present crude oil capacity is approximately 400,000 bbls. greater.

Including the shut-down refineries, the 584 plants of 1925 compare with the 456 figure at the present time, which means that during that period 118 plants have been shut down and dismantled. During the past year six plants were dismantled and have been dropped from the refinery lists.

### Shut-Down Plants

Due to the decrease of 14 in the number of operating refineries, there was an increase of six in the total number of shut-down plants. The 148 plants listed as shut down have a rated capacity of 313,250 bbls. So far as having any future significance in the refining industry, a large number of these shut-down plants could be dropped from consideration. As has been explained in previous annual surveys of The Oil and Gas Journal, most of these plants have been shut down from two to six years. If they were operated again they would practically have to be entirely rebuilt, and the expenditure in most cases would be as large as that necessary to construct an entirely new plant of the same capacity.

In making this year's survey, a special effort was made to check the present status of these shut-down plants. Except for the plants which have been shut down during the past two years, it was impossible in most cases to get in touch with the present owners. The investigations revealed the fact that the companies which last operated the refineries have given up their charters, many having been placed in the hands of receivers several years ago. The present owners are not connected with the oil industry. They purchased the plants to secure the plant sites and the junk value of the plant equipment.

It is needless to state that these old shut-down plants, which for the most part are small skimming and topping units, could not be operated in competition with the operating refineries having modern equipment. Occasionally the owners are able to sell part of the old equipment, such as tanks, pumps and shell stills, to the refiners, who use it at plants already operating.

### Cracking Situation

To many the outstanding development of the year will center around that part of this year's survey which shows that there was a decrease in the number of refineries having cracking units in operation, with an increase of 146,224 bbls. daily in the total rated capacity. This particular phase of the survey might lend to an erroneous conclusion regarding the operations of the past year if certain changes are not understood.

There unquestionably was a distinct slowup in the building of new cracking units during the past year when compared with the previous year which was the most active in the history of the refining industry. A few companies which had construction programs under way or planned at the beginning of the year saw fit to stop work due to the unfavorable market conditions. The break in the crude oil markets early in 1927 which was accompanied by steady declines in the prices received for most refined products was responsible for a situation in which many plant operators decided it would not be feasible to increase their investment in cracking equipment.

In addition to this curtailment of new construction the list of 14 refineries which were shut down during the past year includes a few companies with cracking equipment. These companies naturally could not operate their units with the remainder of their plants shut down. There is the further fact that several companies which had cracking equipment units that had been operating for several years shut them down due to the fact that they can no longer compete in operating results with the modern units now available.

### More Cracked Gasoline

This combination of bad market conditions and obsolete equipment is responsible for the data which show that the number of operating refineries with cracking units is less now than it was a year ago. This does not mean that there was less cracked gasoline produced during the year. This statement is substantiated by the reports of the Bureau of Mines of the Department of Commerce. In this connection attention is called to the insert table in this issue which contains a summary of refinery operations based on government reports covering the years 1916-1927, inclusive.

The government report shows that during 1927 a total of 101,224,000 bbls. of cracked gasoline was manufactured at refineries in United States, an increase of 7,488,000 or approximately 7 per cent over the 93,736,000-bbl. figure for 1926. These figures simply mean that more gasoline is being obtained from fewer cracking units, reflecting the rapid progress in the design of equipment operating at high pressures and temperatures.

### Changes in Cracking

If a detailed study is made of the reports of individual companies in this and last year's surveys it will be noted that a number of companies have changed the rated daily capacities although they are operating the same number of units. This can be explained as being due to the changes made in the units. A large number of refiners during the past year have practically rebuilt their cracking equipment. These changes include the rebuilding of furnaces and enlarging reaction chambers and towers. In some cases these alterations have not changed the rated capacities of the units but they have added greatly to the amount of gasoline produced by each unit.

Another angle to this situation is the new method of rating capacities in some of the new cracking installations. It is customary to rate cracking units on a basis of their daily capacity including both fresh and rerun cracking stock. In its questionnaires this year The Oil and Gas Journal asked that this be the basis on which the cracking units be rated. A few companies, however, in their replies explained that with their new units they could only give a capacity based on fresh charging stock.

In these new units the recycling of the so-called rerun stock takes place in one continuous operation. In other words instead of removing the rerun stock from the unit and then mixing it with it fresh stock for further processing, this stock never leaves the unit until the cracking operation is completed. This means that a unit rated at 1,000 bbls. of fresh stock would have an actual capacity of 2,000

**TABLE 1—GROWTH IN PETROLEUM REFINING (1914-1928)**

| Year— | Total number of refineries | Total crude capacity bbls. dy. | Number of operating refineries | Capacity operating refineries bbls. dy. | Number refineries with cracking process* | Cracking capacities bbls. dy. |
|---|---|---|---|---|---|---|
| 1914 | 176 | ..... | ... | ..... | ... | ..... |
| 1918 | 267 | 1,186,155 | ... | ..... | ... | ..... |
| 1919 | 289 | 1,295,115 | ... | ..... | ... | ..... |
| 1920 | 373 | 1,530,565 | ... | ..... | ... | ..... |
| 1921 | 415 | 1,888,800 | ... | ..... | ... | ..... |
| 1922 | 479 | 2,164,050 | 325 | 1,854,590 | ... | ..... |
| 1924 | 574 | 3,046,790 | 362 | 2,549,490 | ... | ..... |
| 1925 | 584 | 3,063,682 | 385 | 2,680,052 | (†) | (†) |
| 1926 | 515 | 3,068,340 | 356 | 2,770,340 | 150 | 980,960 |
| 1927 | 462 | 3,224,307 | 328 | 2,964,427 | 158 | 1,245,890 |
| 1928 | 456 | 3,428,830 | 312 | 3,115,580 | 148 | 1,327,584 |

*Operating refineries only. †Not available previous to 1926.

Note: The 1924, 1925, 1926, 1927 and 1928 reports were compiled by The Oil and Gas Journal and the remainder by government bureaus.

**TABLE 2—1928 REFINING CAPACITY IN THE UNITED STATES; RECAPITULATION BY STATES**

(Capacities given in barrels daily)

| States— | No. of Plants | Daily Crude Capac. | Plants Oper. | Capac. Oper. Plants | Shut Down Plants | Capac. Shut Down Refrs. | *Plants With Crack. Proc. | Crack. Capacs. |
|---|---|---|---|---|---|---|---|---|
| Arizona | 1 | 600 | 1 | 600 | ... | ..... | ... | ..... |
| Arkansas | 11 | 32,500 | 7 | 27,500 | 4 | 5,000 | 5 | 9,700 |
| California | 64 | 869,750 | 43 | 811,700 | 21 | 58,050 | 11 | 114,300 |
| Colorado | 3 | 3,450 | 3 | 3,450 | ... | ..... | 2 | 1,900 |
| Georgia | 1 | 5,000 | 1 | 5,000 | ... | ..... | 1 | 2,000 |
| Illinois | 13 | 101,900 | 10 | 94,700 | 3 | 7,200 | 7 | 59,500 |
| Iowa | 1 | 1,500 | ... | ..... | 1 | 1,500 | 1 | 1,000 |
| Indiana | 7 | 109,800 | 4 | 105,500 | 3 | 4,300 | 4 | 96,000 |
| Kansas | 26 | 150,700 | 15 | 126,000 | 11 | 24,700 | 14 | 68,800 |
| Kentucky | 12 | 24,800 | 6 | 13,400 | 6 | 11,400 | 3 | 2,900 |
| Louisiana | 20 | 227,380 | 14 | 211,180 | 6 | 16,200 | 5 | 56,800 |
| Maryland | 4 | 53,000 | 3 | 46,000 | 1 | 7,000 | 2 | 45,480 |
| Massachusetts | 3 | 63,000 | 3 | 63,000 | ... | ..... | 2 | 18,500 |
| Missouri | 4 | 19,000 | 2 | 13,500 | 2 | 5,500 | 2 | 11,000 |
| Montana | 15 | 18,550 | 10 | 15,300 | 5 | 3,250 | ... | ..... |
| New Jersey | 9 | 284,000 | 9 | 284,000 | ... | ..... | 7 | 147,700 |
| New York | 4 | 35,500 | 4 | 35,500 | ... | ..... | 3 | 14,000 |
| New Mexico | 7 | 5,650 | 4 | 3,350 | 3 | 2,300 | ... | ..... |
| Ohio | 16 | 55,900 | 13 | 52,950 | 3 | 2,950 | 6 | 30,650 |
| Oklahoma | 67 | 325,200 | 41 | 255,000 | 26 | 70,200 | 25 | 103,550 |
| Pennsylvania | 50 | 187,000 | 45 | 184,500 | 5 | 2,500 | 18 | 65,700 |
| Rhode Island | 2 | 12,500 | 2 | 12,500 | ... | ..... | 1 | 10,000 |
| South Carolina | 1 | 15,000 | 1 | 15,000 | ... | ..... | 1 | 30,680 |
| Tennessee | 2 | 750 | ... | ..... | 2 | 750 | ... | ..... |
| Texas | 92 | 713,300 | 55 | 624,650 | 37 | 85,650 | 20 | 351,300 |
| Utah | 2 | 5,000 | 2 | 5,000 | ... | ..... | 1 | 9,000 |
| Virginia | 1 | 2,500 | 1 | 2,500 | ... | ..... | ... | ..... |
| Washington | 2 | 1,500 | ... | ..... | 2 | 1,500 | ... | ..... |
| West Virginia | 4 | 10,500 | 4 | 10,500 | ... | ..... | ... | 9,724 |
| Wyoming | 12 | 96,600 | 9 | 93,300 | 3 | 3,300 | 7 | 67,400 |
| Total | 456 | 3,428,830 | 312 | 3,115,580 | 144 | 313,250 | 148 | 1,327,584 |

*Operating plants only.

### ANNUAL REFINERY SURVEY

***The data on which the accompanying article is based were taken from The Oil and Gas Journal's 1928 Survey of Petroleum Refining. This survey, which is the most complete report made of the refining industry in United States, is published complete in this issue, starting on page 122.***

***The survey gives a list of all the operating and shut-down refineries by states, including those under construction. The personnel of the operating companies is given, including plant superintendents, purchasing agents and managers of tank car sales and bulk and retail stations. Regarding plant operations, the refinery location, type of refinery, crude oil capacity, type of cracking equipment and capacity of units are given.***

to 3,000 bbls. if the recycling operation was considered.

This change in rating cracking units will no doubt continue to increase in importance in the future. Eventual y it will mean that all cracking units will be rated on basis of their fresh charging stock or on their output of finished gasoline.

**Other Improvements**

The replies received by refiners this year also reflect the fact that there have been many changes in the skimming phase of their plant operations. Many have substituted pipe stills for their old shell stills in skimming the light end products from their crude oil.

The government figures previously referred to show that gasoline recovery from crude oil for the refining industry as a unit increased from 38.5 per cent in 1926 to 39.9 per cent in 1927. Part of this increase can be accounted for by the larger quantity of cracked gasoline and also the increased utilization of natural gasoline at refineries.

The remainder of the increase is largely due to the better fractionating equipment in the crude oil skimming division of refinery operation. Through new towers many refiners have not only increased their percentage yields from their crude oil but also have lowered the boiling point range of their gasoline. Probably more money was spent during the past year in new towers than any other single phase of refinery operations.

**New Refineries**

The development of the West Texas area as a major source of crude oil supplies was responsible for practically all of the new plants that were built during the past year. The other major source of new oil production—the Seminole area of Oklahoma—did not result in the construction of a single new plant although the peak production exceeded 500,000 bbls. daily and the crude oil is especially desirable due to its high gravity.

The crude oil production of Seminole was absorbed through pipe line connections, coupled with water transportation, by refineries in all parts of the country. Although it did not result in the construction of new refineries, it did bring about enlargement programs at several refineries located in Oklahoma.

In West Texas there has been more crude oil than the outside pipe line connection could absorb. This fact accounts for the new refinery construction. During the year the Humble Oil & Refining Co. built a 12,000-bbl. plant at McCamey and a 5,000-bbl. plant at San Antonio. The same company has a 5,000-bbl. plant at Ingleside. All of these are skimming plants. Three other skimming plants were built in the West Texas area. Under the name of the Pasotex Petroleum Co., the Standard Oil Co. of California is building a 10,000-bbl. skimming plant at El Paso, Tex.

Several companies enlarged the capacities of their refineries during the year although as previously explained the main efforts of the operators were directed toward making their present plants more efficient rather than enlarging to handle more crude oil.

At Baytown, Tex., the Humble Oil & Refining Co. in addition to its new plants doubled the capacity of its oldest and largest plant. It now has a rated capacity of 100,000 bbls., making it one of the largest refineries of the industry. In the Mid-Continent, the Empire Oil & Refining Co. completed the installation of new cracking equipment at two of its Oklahoma refineries and one Texas plant.

Practically all of the larger eastern refineries added to their cracking capacities. In several instances old equipment was replaced with the new units.

**Situation by States**

California and Pennsylvania had the largest increase in their refinery capacities. The capacity of the West Coast State increased from 777,217 bbls. daily in 1927 to 811,700 bbls. in 1928. This increase developed despite the fact that there are four less plants operating this year. In Pennsylvania, the capacity of the operating refineries was increased from 178,410 bbls. daily to 184,500 bbls. this year. The increase can be accounted for by the new 25,000-bbl. refinery of the Gulf Refining Co. This plant started late in 1926, but did not start operating until 1927.

Despite the new plants which were built during the year, Texas has the same number of plants operating now as in 1927. The total capacity of the state is also less. Oklahoma lost four operating plants during the year with the rated capacity of the State 5,000 bbls. less. Louisiana has two more plants, due to the resumption of operations at two plants and one new plant now under construction. Montana had a drop from 13 to 10 in the number of operating plants. With the same number of plants operating, Kansas had a slight increase in the capacity of operating refineries.

## URGES STABLE MARKETS AT REASONABLE PRICES

(Continued from Page 92)

industry, we have in this respect fallen into grave error. We are, however, not the only industry that has been affected with the craze for size, which has been accentuated by a too easy credit. Too many, however, seem to have been going on the belief that, while they recognize that there has been overbuilding in both refineries and service stations, in their case they would be able to out-smart their competitors.

We are obviously and admittedly not getting a fair price for our products, but I do not believe that either secret or open agreements or any form of legislation can permanently cure our trouble or run counter to our economic laws. If we were as rapidly as possible to discard antiquated and involved price structures and center our thought upon stabilization, the natural law of supply and demand would dictate that the stable price would be a fair price. Too often the manner in which gasoline has been marketed has been by a series of unnatural cycles. Prices have at times apparently been allowed to reach an unreasonable level with the expectation that a period of uneconomically low prices would be more than compensated for by a period of equally uneconomically high prices. The industry would prosper more on a price which would show only a reasonable margin over the cost of production, if that margin were stable, than it would through a period of violent fluctuations, during which the average price might be considerably higher. Stable markets are very definitely to the advantage of the public, quite as much as to the marketer.

Evolution is ordinarily a slow process, but it is my opinion that our industry has reached a point where the better thought is crystallizing about the policy of stable markets at reasonable prices, as opposed to the older effort to secure the highest possible prices at the cost of violent fluctuations. If the leadership of the industry could be won over to the desirability of stabilizing, proper prices would follow as a consequence. This must come, inevitably, and I believe that before this year is over it will be realized to a greater extent than ever in the past.

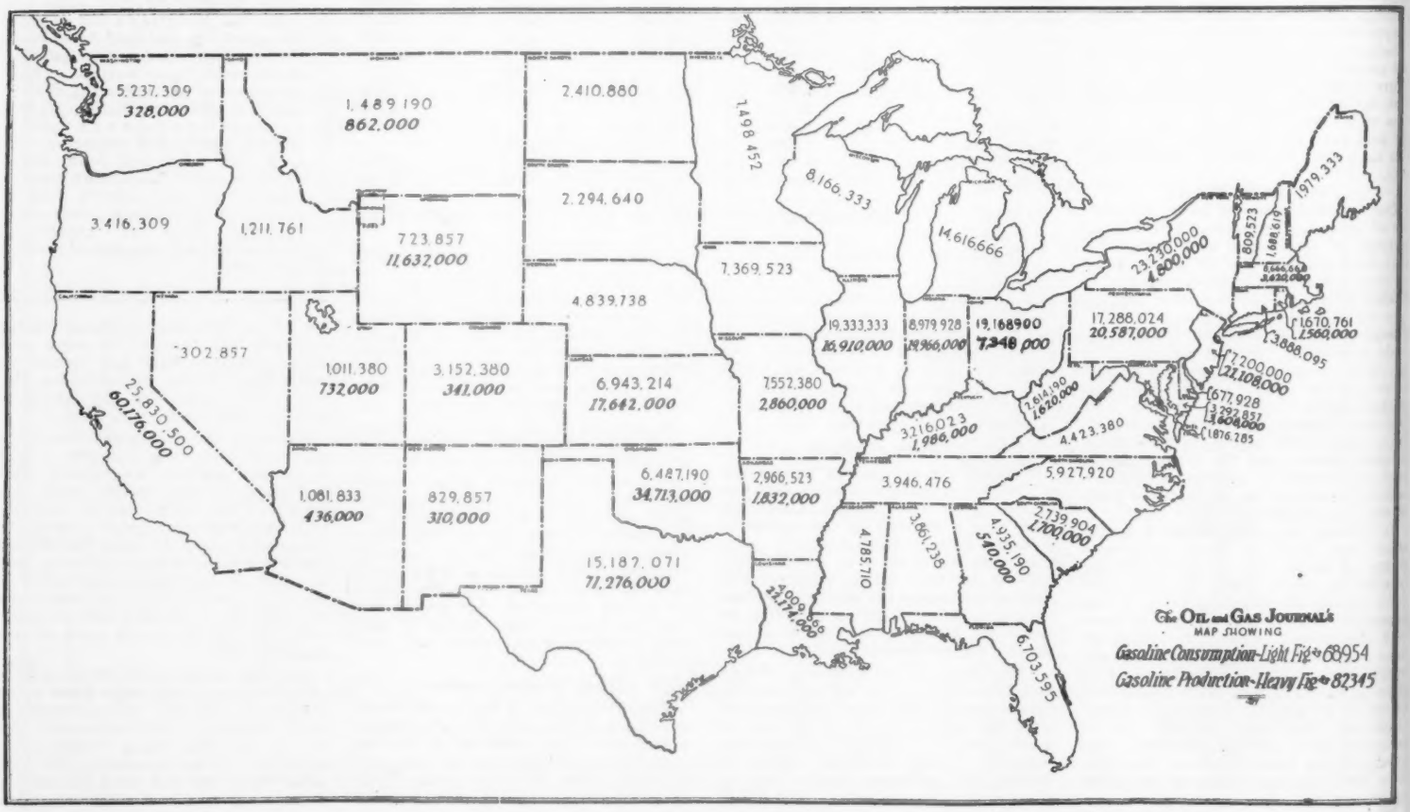
## CAUTION NECESSARY IN MANUFACTURING POLICY

(Continued from Page 90)

the future will undoubtedly prove but gradual; hence only nominal changes in demand from year to year should be anticipated and plans made accordingly.

The technology of the industry may be expected to kep pace with the development of markets, while to the executives must be left the task of using these markets to the best advantage, carefully appraising the volume of material that competing groups or plants can profitably manufacture for these markets, and guarding against methods of retail distribution that adversely affect both manufacturer and consumer.

# Gasoline Production and Consumption By States in 1927




*Above data are estimates based on available information from state gasoline tax and Bureau of Mines reports.*

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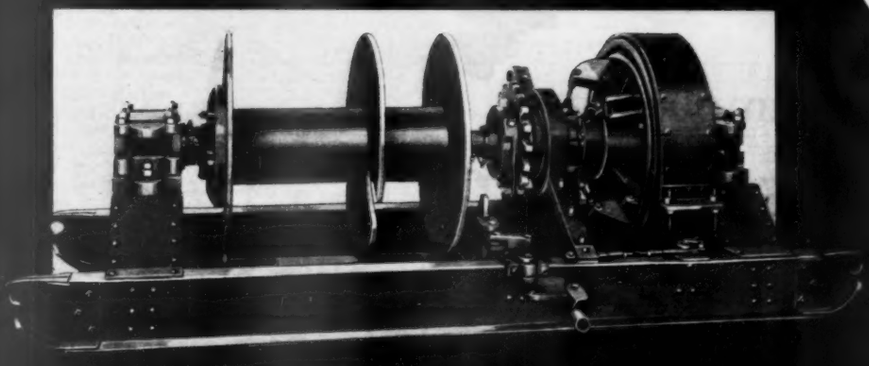

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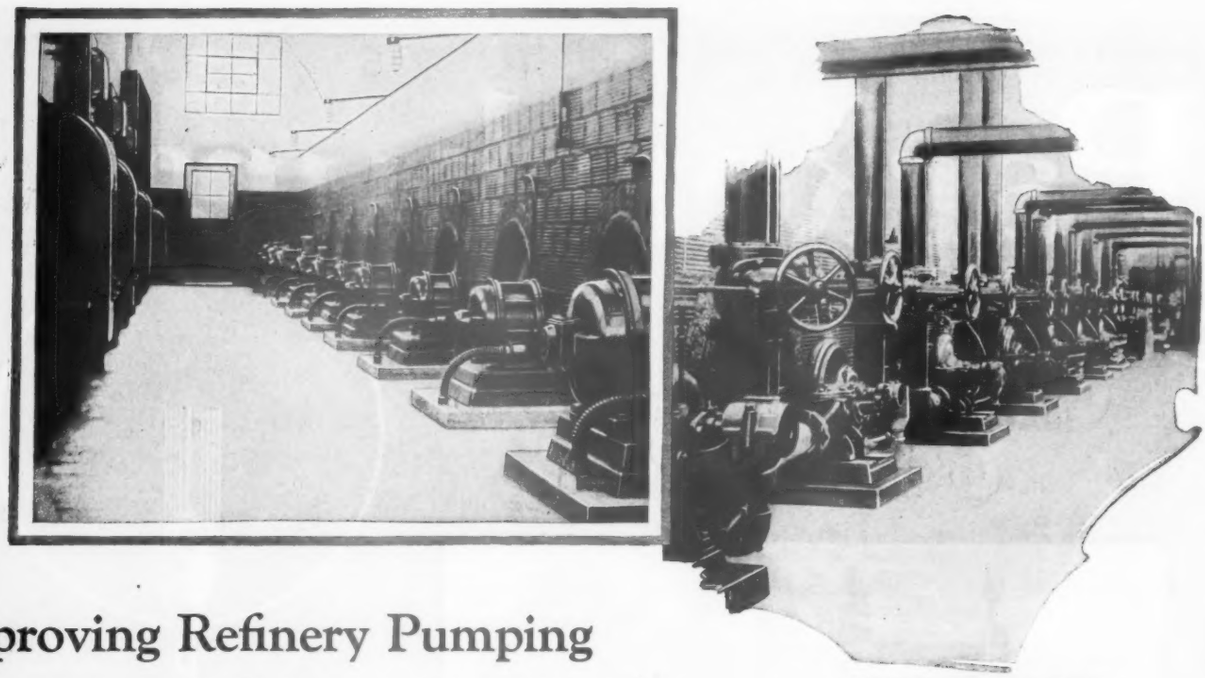

*Above—two views of a modern refinery pump installation at the Skelly Oil Co., Eldorado, Kan., where G-E Motors and Control located on one side of a fire wall operate the pumps installed on the other side. Below—the application of G-E Motorized Power to pumps at the Sinclair Oil & Gas Company's natural gasoline plant in Covington, Okla.*

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# Distillation With Modern Pipe Still

## Representative Installations Indicative of Trend in Design of New Equipment. Method of Control Important Feature

By H. S. Bell*

It seems unnecessary to dwell upon the advantages of the modern pipe still as compared with the older type of distillation equipment used by oil refiners. The relatively low installation cost, coupled with remarkable operating efficiencies of pipe stills, precludes the consideration of other types except in rare instances where some peculiarity of product or plant may have an influence.

The question of the actual heat required to distil petroleum is quite involved. We have extensive data on the latent heats of the various hydrocarbons under different conditions of pressure. We also have information regarding the specific heats of various oils and the effect of temperature thereon. Because of the complexity of petroleum and of each fraction, it seems impossible to theoretically analyze the partial-pressure effect of the great number of hydrocarbons upon one another during distillation.

If a distillation curve and percentage analysis of any crude or product are available, it is possible to construct a curve with ordinates representing per cent distilled and B.t.u. per pound or per gallon, or other desired unit. To do so the crude is split into fractions of 5 or 10 per cent. The boiling point and gravity of each fraction being determined, it is possible to evaluate the heat required. As each fraction is removed, the residue

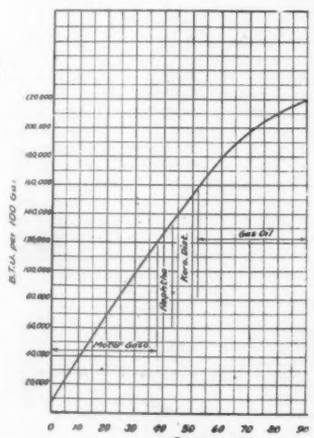


*Figure 1—Heat of distillation (dry) 39.9 degrees Baume North Texas crude.*

must be raised to a higher temperature and latent heat supplied for the successive fraction. As the calculations progress, the latent heats decrease while the specific heats increase. Such a curve is illustrated by Figure 1 for a typical 39.9 degrees Baume North Texas crude.

The chart is illustrative of batch distillation. Theoretically, if the oil were heated by a single flash in a pipe still, the partial-pressure effect of the light products would result in the removal of the same amount of vapors at a lower temperature. Practically, we find that because of the necessarily extensive fractionating equipment required when separating many products all in vapor phase, the oil has to enter the separator at temperatures corresponding to or even above those required in the batch still. Furthermore, in single-flash distillation the vapors evolved in the heater must be superheated to the outlet temperature. Very little is known concerning the specific heat of the vapors, and the theory is complicated by the constantly changing pressure in the heater. In the calculation of the heat input, it is believed that this method (illustrated by Figure 1) is sufficiently accurate until further data from research are available.

The efficiency of heat transfer is dependent on the velocities of the two exchanging mediums. Oils is a relatively poor conductor of heat and convection currents in large bodies of oil are very sluggish. Consequently, we find that in the case of shell stills, oil will not absorb more than 3 to 4 B.t.u. per square foot per hour per degree difference between flue gas and liquid unless some means of forced circulation is employed.

If more heat is supplied to the plate than the oil can absorb, scorching of the oil and burned still bottoms result. Analysis of the heat input into oil passing through tubes at high velocity shows

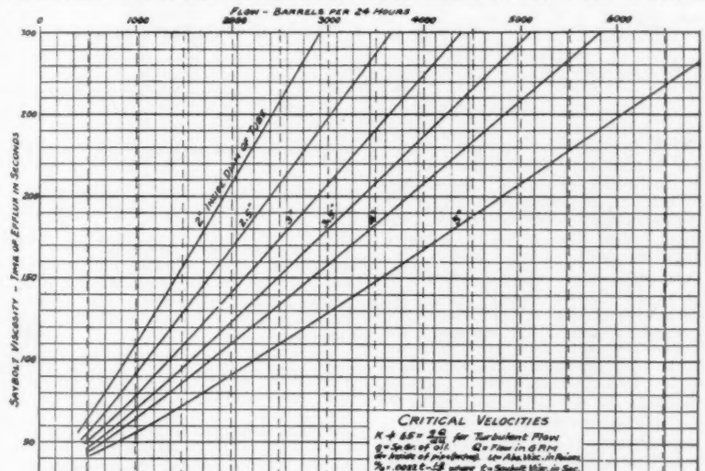
Flow - Barrels per 24 Hours
Saybolt Viscosity - Time of Efflux in Seconds
Flow - Gals. per Min
Critical Velocities
K = 65 = 2gQ/du for Turbulent Flow
g = Spec. of Oil. Q = Flow in G.P.M.
d = Inside of pipe (Inches) u = Abs. Visc. in Poises
= .0022t - 1.8/t where t = Saybolt Vis. in Sec.

*Figure 2—Minimum quantity of oil to insure turbulent flow.*

that 12 to 14 B.t.u. per hour can be safely transferred for each square foot per degree temperature difference.

For efficient transfer of heat we must have counterflow of the exchangeing mediums. This cannot be accomplished in batch stills but is a feature of the well-designed pipe heater.

To avoid hot spots on a conventional still-bottom furnace, temperatures are rarely allowed to exceed 1,600 degrees to 1,800 degrees. The usual practice has been to dilute the furnace gases with excess air at sacrifice of furnace efficiencies. Higher furnace temperatures are possible in pipe stills. The velocity and intimate contact of the hot flue gases are essential to input of heat to the steel surface, and here again, the tube-still lends itself to efficient design.

### Phenomena of Flow

We are familiar with the two phenomena of fluid flow in pipes. First, streamline flow, where the fluid may be considered as a number of concentric cylinders each sliding past its neighbors; that next to the wall of the conduit has the slowest motion; the center one has the fastest. As increments of pressure are applied, the velocities are increased until a point is reached where further increments of pressure produce no increase of velocity. With further increases of pressure, a second point is reached when a further increment again raises the velocity. The fluid has now reached the second phenomenon of flow, called "turbulent."

Obviously, under the first conditions the outer cylinders of the fluid passing through a heater are raised in temperature above the average of the fluid, and local overheating is probable. When the flow is turbulent, the fluid is rolling and eddying through the pipe and conveys heat from the wall to the body of the oil so that local overheating is avoided. Designers, therefore, endeavor to maintain turbulent flow throughout the coil.

The turbulence factor may be expressed by the formula

$$K = \frac{gQ}{du}$$

g = specific gravity
Q = gallons per minute
d = pipe diameter (inches)
u = absolute viscosity

If K exceeds a value of 65, the flow is turbulent. Viscosity decreases as the temperature rises; a decrease in viscosity increases the turbulence factor, so, obviously, if the oil in a pipe heater is in turbulent flow at the inlet, turbulence is assured all of the way through. Figure 2 shows the minimum quantity of oil of different viscosities flowing through tubes of various diameters that will insure turbulent flow.

Assume a capacity of 2,500 bbls. per day for a still of 4 inches outside diameter No. 8 g. tubes, with an inlet temperature of 275 degrees Fahrenheit; at which temperature the oil has a viscosity of 40 seconds Saybolt. The flow at the inlet is turbulent. If 50 per cent is to be vaporized, the outlet velocity will be in the neighborhood of 250 feet per second, or nearly 3 miles per minute. With further vaporization, even higher velocities are met.

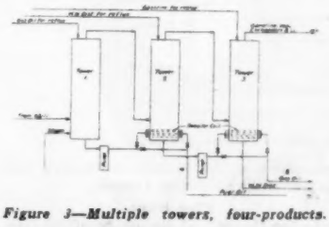

*Figure 3—Multiple towers, four-products.*

### Pressure Drop

On account of constantly changing temperatures, viscosities and gas volumes, it is impossible to theoretically predetermine the pressure drop through a pipe heater. The best forecast is empirical, based upon tests of similar heaters in service.

From the outlet of the pipe heater, the mixed oil and vapors are introduced to an evaporating chamber. Here we find a great many different types in service. Some are horizontal with longitudinal splash plates, some vertical with conical baffles. Others introduce the oil at a tangent in a vertical separator. Sometimes the stream is led directly into the fractionating column. All designs have some peculiar merit and meet to a greater or lesser degree the purpose. The evaporator should spread the oil out in a film to allow plenty of disengaging surface and be of a size to give sufficient time for separation.

Whether the evaporator is part of the column or is separate, we have at its outlet the same conditions; namely, a large volume of vapor composed of all of the overhead products. Upon their efficient separation into close commercial cuts depends the success of the distillation unit as a whole.

The bubble cap tower has superseded all other types for this service in connection with modern pipe stills. Here again we find a wide variation in design. In principle, the bubble tower may be likened to a series of small superimposed stills. Each plate receives heat from the ascending vapors. Through the intimate contact of vapors with the liquid on the plate, there is an interchange of heat and the heavy ends of the vapors are condensed into the liquid, while the light ends of the liquid are evaporated and ascend with the vapors to the tray above.

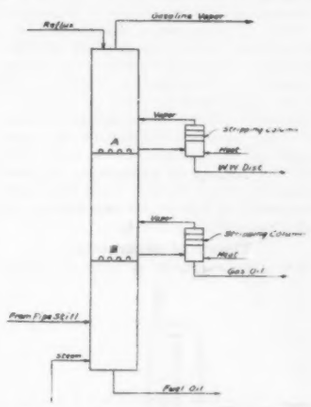


*Figure 4—Single-tower, four-products.*

### Bubble Towers

Books have been written upon the subject of fractionation in bubble towers. It is beyond the scope of this paper to go into the theory in detail, but a few principles and conclusions should be kept in mind.

If there is no heat loss, and in a well insulated column this loss is negligible, the liquid descending through the tower is supplied by returning a portion of the condensed vapors leaving at the top. If a column is supplied with a certain amount of heat at the base measured above a certain temperature, and there is no loss of heat, the sum of the heat in all streams leaving the tower will have to add up to the heat input. In the tower there is necessarily a drop in temperature as various fractions are condensed out. This sensible heat and the latent heats are abstracted by evaporation of the reflux fed into the top of the tower.

If perfect mixing were possible on each plate, the vapors ascending into the plate would be completely condensed into the

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liquid on the plate. This heat of condensation would evolve a new vapor, which would ascend to the plate above. Such a plate is termed the "ideal section" and is the basis of the theory of bubble columns.

The minimum amount of reflux for any given separation is attained only by an infinite number of ideal sections. This minimum reflux is a function of the concentration of light ends desired in the final product and the composition of the feed to the column. Since we can build neither an ideal plate nor a column with an infinite number of plates, some balance must be established between the amount of reflux and the number of plates. The lower the reflux ratio, the less heat will be required to effect the separation, but more plates must be used.

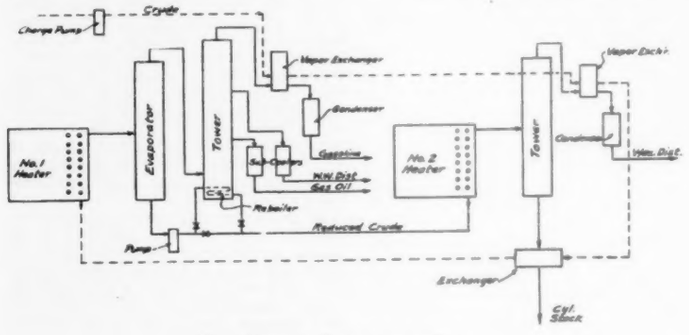


*Figure 5—Series pipe still.*

If fuel is expensive, the column should have more plates and less reflux than would be the case with cheap fuel.

Since no plate is 100 per cent efficient, it follows that the liquid on any tray is never completely stripped of the light boiling fractions found on the tray above. By means of multiple trays it is possible to make a commercial separation of a light product and a residue. If absolute separation of light products from residue is desired, it is necessary to redistil the residue. This may be done by the use of a separate column or stripping section, but in any case is dependent on the introduction of more heat. These facts illustrate the fallacy of attempting to bleed finished products directly from the tower. The means to effect the separation will be discussed later.

### Theory of Separation

It is unnecessary to go into the theory of heat exchangers and condensers—both are important adjuncts of pipe-still units—but it is in order to discuss the preceding general theory as applied to the integral parts of a pipe still.

With reference to the furnace proper, it was stated that the pipe still is admirably adapted to counterflow of oil and flue gases. Therefore it is generally possible to bring the exit-gas temperatures down to as low a figure as will provide sufficient draft. With the usual heat-exchanging systems, inlet temperatures of 300 degrees to 350 degrees are encountered. Occasionally, more extensive application of heat exchange is made and temperatures up to 500 degrees are on record. It should be pointed out that inlet temperatures around this figure begin to affect the furnace efficiency adversely. Since the overall efficiency is the more important, a proper balance should be struck.

Correct furnace design is of prime importance to successful pipe-still operation. A surface will absorb heat from a radiating surface at about 10 times the rate of the absorption of heat by convection. Therefore the part of the pipe still doing the most work per square foot of surface is that exposed to direct radiation. The design of this section must carefully analyze the oil temperature and velocity to be sure that it will be able to absorb this heat. Otherwise, carbonization and burned tubes are inevitable.

It has been found that radiant heat and flame impingement on the same surface create a serious condition. By elimination of the flame impingement, higher furnace temperatures may be carried. The radiant tunnel construction is a development along this line.

Another line of approach toward the elimination of overheating is to keep furnace temperatures at a lower degree. The admission of excess aid to accomplish this purpose is wasteful from all standpoints, but is the method still used in many plants. Recirculation of the flue gases will attain the results desired and at the same time maintain a high efficiency.

The mechanical side of furnace design is also important. The settings of a great many pipe stills are badly cracked by expansion strains. Air infiltration and consequent decrease of efficiency result. The suspension of the tubes by a structure independent of the furnace brickwork will eliminate much of this trouble.

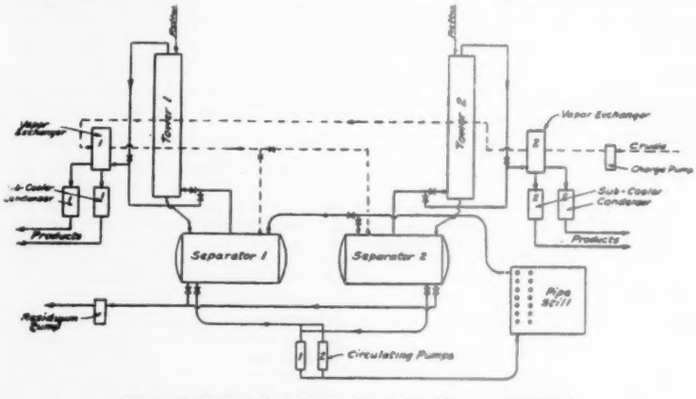


*Figure 6—Duplex circulating pipe still. (Patents pending.)*

### Pipe Sizes

In the theoretical discussion of the flow of the oil through the tubes of a pipe still, it was pointed out that if the oil was above the critical velocity at the inlet there was no danger of streamline flow further on. In the early days of pipe-still design, some units were built with tubes of 2-inch diameter, and even smaller, with the idea of maintaining high velocities, but with such tubes trouble will ensue if the charging pump stops. Therefore, the practical consideration of ease of cleaning must be balanced against the desirable tube velocities. A small tube in a furnace of normal width at the usual temperatures will tend to bow and warp, thus adding to the inherent difficulty of cleaning the small bore. Therefore, we rarely find tubes of smaller diameter than 3 inches. The usual sizes are 3 inches and 4 inches and if the use of such sizes results in too much pressure drop, it is considered good practise to use two or more tubes in parallel.

### Bubble Towers

Bubble towers are available in a multitude of designs. Provided the number of caps and plates is sufficient for the separation desired, good results may be anticipated. The question of control is important. The inlet temperature at the base is capable of control by the heater. The top temperature will depend on the amount of reflux. Two general methods are used to furnish this reflux; first, using partial condensers; and second, pumping back a portion of the finished top product.

The results by both methods are the same, and the selection depends on practical considerations. If partial condensers are used, they must be placed so that the condensed product used for reflux will drain back to the tower. It is customary to use oil for cooling, thus making the partial condenser part of the exchanging system. The worst conditions, as far as corrosion is concerned, are usually found at the condensing point of products ranging from 180 degrees to 250 degrees Fahrenheit. This is just about the condition under which a partial condenser will operate so that relatively high maintenance may be expected.

On account of the added cost of steel structures to support the partial condensers, the difficulty and expense of repairs so high aboveground and the disruption of operating conditions in the tower when such apparatus is out of commission, we find the trend away from such methods of control and towards the pump-in method.

Using a pump, the partial condenser becomes only a heat exchanger and may be set low. If the condenser is proportioned for emergency operation, the exchanger may fail and the tower will still function at the cost, of course, of some extra fuel.

Electric and air-actuated controllers are in use with both systems to control the top temperature. The ideal tower control is one that gives a balanced condition of the reflux so that the tower temperature is held constant. With this condition, the result will be—theoretically at least—a maximum yield with the smallest amount of fuel for any particular installation.

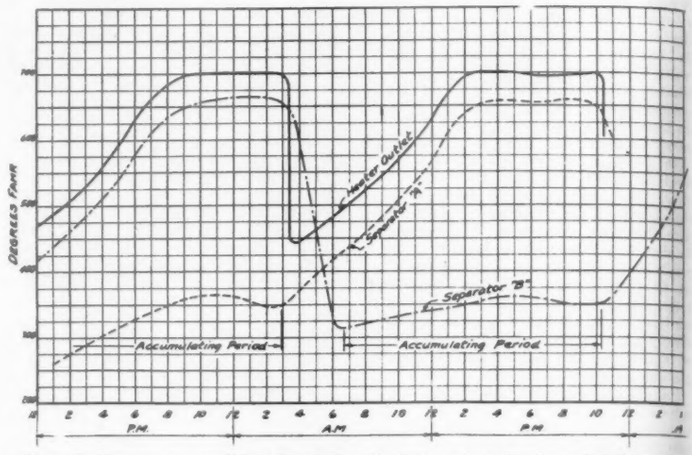


*Figure 7—Temperature conditions for duplex circulating unit at Continental Refining Co., Oil City, Pa. Results of August 13-14, 1927.*

### Pyrometers

The problem, then, is to obtain a control instrument that will give this balanced condition. The sensitivity of the control mechanism will determine to a large extent whether or not the desired end points are obtained. There are two general classes of instruments which are being used satisfactorily: (1) pyrometer controls and (2) air-actuated controls.

Undoubtedly a pyrometer is more sensitive than any other type of temperature-measuring instrument. However, there must be a periodic make and break in a pyrometer temperature controller, and during the period that the thermocouple is disconnected from the motor-operated valve the reflux may become unbalanced, with the result that the tower temperature will not remain constant. From a practical point of view, the advantages of this type of instrument are that it may be located at any desired point without affecting its sensitivity, and the control may be set at the exact temperature at

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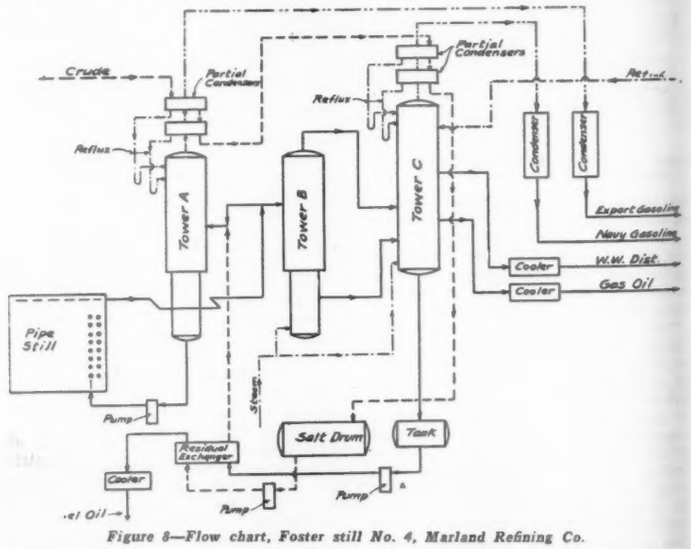


*Figure 8—Flow chart, Foster still No. 4, Marland Refining Co.*

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# Acid-Sludge Problem in Oil Refining

## Several Methods of Disposal Now Being Tried Out. Substitutes for Acid Also Receiving Attention

By J. B. Rather*
*Standard Oil Co. of New York.*

In the same year as the Drake discovery (1859), a patent (U. S. 24,952) was granted to Henry Pemberton for a method of treating acid sludge. While this patent applied principally to sludge of bituminous origin, reference was also made to acid sludge from petroleum distillates. The proposed process consisted of:

1. A preliminary heating to obtain a separation of the free sour oil.
2. Agitation of the acid-sludge residue with hot water and open steam.
3. Separation of weak acid and tar.
4. The recovery of acid by evaporation of the weak acid in lead pans.

The patent is particularly significant in as much as the process formed the basis for a majority of the later patents. The Pemberton patent was followed by somewhat similar ones by Loftus in 1864, by Penissant in 1878 and by Farrar and Gill in the same year. These three patents form the foundation on which all modern practice of acid separation and recovery is based. Since that time many patents have been issued, a few of which are mentioned below, but practically all of them utilize the basic procedure of diluting with water, agitating and settling.

Bower, in 1880, recovered sulphuric acid by washing the sludge with water in covered tanks and mechanically separating the acid solution from the carbonaceous matter and oily ingredients. Breinig, in 1884, mixed with the sludge a soap compound adapted to unite with the tar, and separated the free acid from the tarry mass. J. L. Gray, in 1909, claimed the production of pitch and asphalt from petroleum sludge by digestion with water, steam, or dilute acid recovered from the sludge, until the major portion of the acid had been recovered. The tar, comparatively free from acid, was heated with a steam spray until the mass was converted into pitch. Another of Gray's patents covered a process in which the acid sludge was digested with water, air and steam, until the light constituents rose to the top. These were drawn off, and the digestion continued until a second grade had arisen. A heavy residuum was drawn off from the bottom of the separator, and the weak acid finally separated.

Schildhaus and Condra, in 1910, heated acid sludge to 200 to 300 degrees Centigrade and at the same time introduced air into the retort at about the same temperature. The liquid hydrocarbons were distilled and condensed, and the gases, consisting largely of sulphur dioxide, were washed first with heavy hydrocarbon oil and finally with sulphuric acid. No better means of producing sulphur dioxide from the materials at hand could have been thought of.

Van Tienen, in 1911, appears to have been among the earlier inventors making use of both heat and pressure for sludge separation. He recovered hydrocarbons and sulphuric acid from sludge by mixing sufficient water with it to dilute the acid to 52 degrees Baume, and heating the mixture to a temperature of 140 to 165 degrees Centigrade at a pressure of about 100 pounds per square inch. The liquid was separated into two layers, one containing sulphuric acid and the other containing tar.

A type of separation for sludges from so-called "paraffin" lubricating oils, largely used in the past, and still the most desirable under certain conditions, consists in cooking the sludge, without dilution with water, with open steam in a cone-bottom, dome-top, lead-lined agitator, equipped with a scrubbing device for taking care of the sulphur dioxide and other vapors evolved. The cooking is carried on for several hours, after which the batch is allowed to settle into three layers, acid of about 45 degrees Baume, pitch, and acid oil. The acid and acid-oil layers are drawn off and the pitch layer is fed to a screw conveyor, where it is subjected to a spray of cold salt or fresh water. This operation transforms the pitch into coke-like particles of about one-half to 1 inch diameter, which can be handled and burned under boilers or stills like coal.

This method has not proved altogether satisfactory, on account of the difficulty of transporting the acid coke or pitch and to the corrosive action on equipment when burning. The more recent installation of specially designed fireboxes and burning equipment has increased efficiencies in this connection.

An alternative practiced in some refineries consists in the neturalization of the acid coke with alkali after separation of the weak acid. The product in this case is liquid, pumpable and may be burned to advantage in the usual fuel oil equipment. It is sometimes necessary, however, to add gas oil before burning, to lighten the consistency.

### Forms of Separators

The first form of separator was nothing more than a tank provided with means of agitation and suitable connections for withdrawing the acid and oil. This type of separator was adequate as long as gasoline and kerosene from paraffin-base crudes were the only products. The light character of sludges from these sources made the separation problem a simple one. It was soon found, however, that simple agitation with water would not serve to separate lubricating-oil sludges, and accordingly open steam pipes were introduced into the separators. With other types of sludges, notably those obtained from fuming acid treats of naphthese-base kerosene distillates, it became necessary to cook many hours with steam under a pressure of several atmospheres.

All of these types of separators were intermittent, or "batch" separators. Continuous separators are a more recent development. Heckenbleikner, in 1926, patented a separator consisting of a "closed pressure container, having an exterior acidproof lining and an interior refractory facing for the lining." Suitable lines and tanks necessary for accomplishing the continuous separation of the acid sludge and its constituents are provided. An eastern refiner uses a simple device for separating in a continuous manner the sludges obtained from 66 degree acid treatment of gasoline and kerosene distillates. This separator operates without external heat and without pressure. It delivers a separated acid of constant gravity and requires practically no attention.

Separators may be of almost any size, from 50 to 500 bbls. capacity, depending on the amount and nature of the sludge available and on whether or not the separated sludge is to be fluxed in the separator. A typical batch separator for light-oil sludge consists of a lead lined, cone-bottom and cone or dome-roofed tank, equipped with water and air lines and sludge intake and drawoff connections. Frequently it has means of scrubbing the air as it goes out of the separator, in order to remove the sulphur dioxide which is invariably evolved in considerable quantities.

Separators for certain types of Pacific Coast light-oil sludges are practically autoclaves capable of withstanding a pressure of 100 pounds per square inch or more, in which the sludge is cooked with water and steam for several hours.

Where light-oil and lubricating-oil sludges are available in the same plant, they are frequently combined before the acid-separation process, and the resulting mixture of pitch and acid oil is fluxed with heavy fuel oil. In general, separators for this purpose are of conventional design, as described above.

### Acid Concentrators

Many of the earlier refineries had sludge-acid separation plants but were not equipped for acid concentration. The separated acid was sold to other refiners equipped to concentrate acid, or to manufacturers of acid phosphate intended for fertilizer, or disposed of by dilution with sea water, where that was available.

Concentration methods were given attention by inventors at an early date. Both Loftus, in 1864, and Penissant, in 1878, described methods for concentrating separated acid. Gronsilliers, in 1888, added sodium sulphate to the separated acid and the bisulphate was precipitated by boiling and evaporating. The precipitate was dried and the acid recovered by heating at a moderate red heat. Waring and Breckenridge mixed about 4 per cent of sodium nitrate with sludge acid at a temperature between 60 and 180 degrees Fahrenheit, to purify it and permit the recovery of the sulphuric acid. A foreign patent of interest is that of the Steaua Romana Petroleum G.m.b.H., in which the separated black acid was allowed to flow continuously into pure boiling concentrated sulphuric acid in the presence of an oxidizing current of air, the evolved acid vapors then being condensed and reconcentrated in standard apparatus.

The common American practice in sludge-acid concentration up to about 1920, consisted in concentrating to 60 degrees Baume in lead pans, and finishing to 66 degrees Baume in cast iron pans or glass retorts. The lead concentrating pans commonly employed varied considerably in size in the different plants. According to Day, units 5 feet wide by 50 feet long and 10 inches deep, as well as a series of shorter pans of the same width (15 to 20 feet long) were not uncommon. Such pans were generally constructed of 10-pound chemical lead, and supported by perforated cast iron plates laid over the furnace flues. Heat for concentration was frequently supplied by combustion of the separated acid oil.

The acid left the last compartment of the pan, or the last pan of the series at about 60 to 62 degrees Baume, and passed to a series of two cast iron pans or "stills," generally about 4 feet by 8 feet by 10 inches deep, provided with hoods lined with acid-resisting material, leaving the end pan at a temperature of about 450 degrees Fahrenheit and a gravity of about 66 degrees Baume. The vapors were usually condensed in a scrubber and the weak acid returned to the system. The life of these castings was very short, averaging in one western plant about six weeks, and failure of the pans frequently resulted in the loss of appreciable percentages of acid.

Increased efficiency in operating pan

(Continued on Page 138)

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## Handling of Corrosive Crudes Continues Complicated Problem

By E. R. LEDERER
*Vice President, Texas Pacific Coal & Oil Co.*

*Many refiners will be confronted in 1928 and during the coming years with the problem of handling highly corrosive crudes. The distribution of sulphur compounds in crude from the Permian basin is different from most sulphur-containing crudes so far run. The hazard for life and equipment begins at the well, continues in the storage tanks at tank farms and refineries, and becomes more serious, when such crudes are subjected to distillation. Composition and characteristics of these sulphur compounds vary in each cut and have to be treated differently to lower the sulphur contents to the required percentage. Until better and cheaper corrosion-resisting metals or alloys are produced, so they can be used in the construction of internal combustion engines, it will be necessary to keep the sulphur contents of motor fuels at a minimum. The metallurgical engineer will have to co-operate with the refinery chemist and engineer in order to combat successfully excessive corrosion of refinery equipment. Chemicals used to neutralize the various types of acid, freed and formed during one process of distillation, are injurious to the equipment used in the next step and have to be*

*(Continued on Page 239)*

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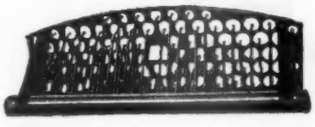

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# Research Will Stabilize the Industry

## Development of New Products and Widening Utilization of Those Already Known Will Aid in Solving Overproduction

H. W. Camp*
*General Superintendent of Refineries, Empire Oil & Refining Co.*

Research is defined, scientifically, as a "systematic investigation of some phenomenon, and also a search for hidden treasures." Chemists tell us that the hidden treasures of petroleum are far richer than the products which have been best known to us. However, these secrets will be discovered only through intensive and systematic, as well as scientific, industrial research. Indeed, the scope of the subject is so great that such an intensive research program should be assumed by a centralized organization supported by the petroleum industry as a whole. Such organization would assume the responsibilities for investigation of new products and development of markets for such products.

Gasoline, the chief product of the petroleum industry, has become a cheap commodity. The continual uncontrolled overproduction of crude petroleum, the intensive competitive condition in the marketing of petroleum products and the increase of refining efficiency and installing of cracking facilities, have all combined to lower the market value of gasoline. The lower cost of gasoline has all been passed on to the purchaser in the form of lower prices so that today the most important product can scarcely be manufactured at a profit.

In other fields, manufacturing industries have diversified their products when faced by a similar situation. Thus, they have been able to widen their marketing outlook. Why cannot the petroleum industry employ the same tactics?

Right now we are hearing much discussion concerning the development of a wider market for existing petroleum products and new products for existing or prospective markets. For instance, we can cite recent developments for use of propane, butane and ethylene. Butane has been found to be an efficient and inexpensive refrigerant, especially adapted to home refrigerating systems. Propane and butane fractions of natural gasoline may be shipped under pressure and may be used as a substitute for acetylene in cutting torches in connection with oxygen. There is a possibility of substituting butane for gas oil in the carburetion of coal gas, as we know that butane contains practically the gas enrichment as the same volume of gas oil and should prove to be a superior product for this function. Ethylene, a hydrocarbon present in cracked gasses, is finding an outlet for the artificial ripening of green fruits.

Following is a table of the more general uses of petroleum products as now established.

### Uses of Petroleum

Hydrocarbon Gasses: 1. Fuel. 2. Natural gasoline; (a) blending with refining gasoline; (b) motor fuel; (c) aviation fuel. 2. Carbon black; (a) paint; (b) ink; (c) rubber tires. 4. Liquefied gases: (a) Coal gas enrichment; (b) refrigeration; (c) chemical synthesis.

Light Distillates: 1. Gasolines; (a) motor fuels; (b) general solvents (commercial solvents). 2. Naphthas; (a) dry cleaning; (b) paints; (c) soap manufacture. 3. Kerosene; (a) tractor fuel; (b) heating; (c) illumination.

Intermediate Distillates: 1. Gas oil; (a) Diesel fuel; (b) cracking stock; (c) coal gas enrichment. 2. Absorption oil; (a) gasoline recovery; (b) benzol recovery.

Heavy Distillates: 1. Lubricating oils; (a) internal combustion engines; (b) industrial uses. 2. Technical oils; (a) medicinal; (c) emulsifying. 3. Waxes; (a) candles; (b) waterproofing; (c) sealing.

Residual Oils: 1. Cylinder stocks; (a) bright stocks; (b) steam cylinder oils; (c) grease compounding. 2. Fuel oil; (a) boiler fuel; (b) frunace; (c) gas manufacture. 3. Greases; (a) heavy lubrication. 4. Asphalt; (a) paving; (b) roofing; (c) paints. 5. Coke; (a) fuel; (b) carbon products; (c) graphite.

Sludge Products: 1. Acids; (a) source of valuable chemicals.

Petroleum, with its high hydrogen content and mobile character, is an ideal raw material for the manufacture of synthetic organic compounds, which can be produced economically, the extent of which cannot even be predicted. However, we do know that many valuable organic compounds, now chemical curiosities, will be available in quantity as by-products of petroleum.

### Organic Compounds

Classes of organic compounds capable of synthesis from petroleum, with examples and general uses are as follows:

Alkyl Chlorides.—Methyl chloride, ethyl chloride, carbon tetrachloride, chloroform and others. Chiefly used as refrigerants, solvents, anesthetics, and as a base for further chemical synthesis.

Alcohols.—Methyl, ethyl, propyl, butyl, amyl, higher alcohols, and other alcohols, such as the glycols. Chiefly used as general solvents and for the rayon silk and pyroxylin lacquer industries.

Aldehydes. — Formaldehyde, acetaldehyde, etc. Chiefly used in manufacture of synthetic resins, (bakelite), antiseptics, denaturants and as a base for synthesis.

Esters.—Propyl acetate, amyl acetate, butyl acetate. Chiefly used as a base for pyroxylin lacquers and chemical synthesis.

Fatty Acids. — Formic, etc. Undeveloped at present time but edible fats, butter and lard substitutes, and soaps are possible from petroleum synthesis.

Ketones.—Acetone, methyethyl ketones, etc. Chiefly used for solvents and as a base for chemical synthesis.

Aromatics. — Benzol, toluol, etc. Dyestuffs, saccharin; explosives, antiseptics, perfumes, artificial leather, etc., can be synthesized from petroleum in competition with coal tar industry.

### Industry in Infancy

The synthetic chemical industry based on petroleum as a raw material is now in its infancy. However, this field has possibilities of equaling or even surpassing the industry built up around coal tar both in magnitude and variety of products. The vast majority of the petroleum derivatives are nonbenzenoid hydrocarbons and as such would not compete with coal tar derivatives. The present production of synthetic organic chemicals, especially the alcohols, glycols, aldehydes and their derivatives, is now being consumed by industrial markets, particularly in the lacquer, bakelite, automobile and explosive industries. Their uses are definitely established and the demand in these fields is increasing daily.

At the present time there is an annual consumption of approximately $900,000,000 worth of chemicals, a large part of which are organic chemicals capable of synthesis from petroleum. The extent to which synthetic petroleum products can break into that market depends upon the ability of the petroleum industry to manufacture a product of superior quality or better the prices of the same quality product as produced by present (other) processes. For example, the manufacturer of synthetic isopropyl alcohol must make a purer alcohol or must meet the price of isopropyl alcohol derived from acetone, a fermentation product. In case

(Continued on Page 137)

### PETROLEUM AND THE AMERICAN HOME

*Let us draw for your imagination, a picture of an average American home a few years from now when petroleum synthesis has been developed so as to produce the various products which are within the bounds of possibility. The interior decoration of the house is pyroxylin lacquer and bakelite furniture, of course, is used throughout. The heating system is operated with residual gas and furnace oil distillate burner, and refrigeration is effected by the use of methyl chloride. The linoleum, shingles, leather upholstering, bathroom fixtures, are all products of petroleum.*

*In the medicine chest, we find camphor, turpentine, disinfectant, alcohol, vaseline, ointments and salves, purgatives, liniments and other items derived from petroleum. Milady laves her hands with soap, and perfumes her bath and person with delicate perfumes, puts on her make-up, dresses in artificial silk and the unromantic and evil-smelling crude oil has through the ingenuity of man, furnished all these necessary aids to femininity.*

*A typical breakfast might consist of eggs cooked in lard substitute, toast spread with synthetic dairy butter, and coffee sweetened with petroleum derived saccharin.*

*Milady drives her car out to do her shopping, the car operating on knockless motor fuel, entirely different from our present fuel, and riding on tires developed from petroleum. The lacquer on the car, the leather upholstering, floor covering, instrument board, horn button and other fixtures are petroleum derived. Detouring a few blocks where workmen are blasting with explosives, originally petroleum, she stops and buys a package of her favorite hydrocarbon chewing gum.*

## Says Increasing Consumption Is Remedy for Overproduction

By C. L. HENDERSON

*Vice President, Vickers Petroleum Co.*

*If it were possible to discontinue this year, the expenditure of money for refinery improvements and expansions, and further, if only a comparably small part of the budget so saved could be expended in developing sales methods and in expanding markets, the returns to the industry would be much greater than if the expansion and improvement programs were carried out as they are probably now planned.*

*The oil industry has apparently been satisfied with the demand for petroleum products which has increased through no effort of the oil industry. If it has not been satisfied with the demand, it certainly has not been dissatisfied sufficiently to put forth much effort to increase consumption and broaden markets.*

*The evils of overproduction can be remedied by controlling and limiting production or by increasing consumption. The difficulties of controlling production are well known, and while some progress has been made in this direction, it will probably be some time before any definite relief can be expected to come from such a movement. No legislation is necessary, nor any laws need be violated if the industry would devote some time and money to the problem of increasing consumption.*

*Before A.I.M.E. New York meeting.

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# Physical Control in Plant Operation

## Proper Application Necessary at Modern Refineries in Order to Secure Maximum Economies With New Type Equipment

By Luis de Florez*
*Consulting Engineer.*

In the physical operation of a process, such as for example in cracking, our information is obtained by pressure and temperature instruments, etc, which permit us to visualize existing conditions under which the operation is being carried out. The information at hand is then analyzed and certain conclusions arrived at as to the results which will be obtained under the observed conditions. If this analysis should indicate, in the light of past experience, that an unfavorable result will be obtained, certain conditions of operation are altered until the desired results are assured.

In the physical control of a refining process we must rely on experience for the choice of information and its interpretation. Each type of process has its characteristics, and the data required and its bearing on the result will, obviously, be individual to the process in question. Likewise, the means and methods of effecting corrections present different problems in each case, and the choice of the most favorable procedure to carry out its action must vary with the circumstances.

There are, however, some general considerations which govern the choice of the variables which we have to indicate the action of equipment and on which we base the conclusions which will result in the necessity of making corrective changes. These general considerations also apply to the choice of means or variables with which to obtain the regulation required.

### Two Main Functions

There are two main functions to be performed in a scheme for control; one consists of measuring certain operating conditions and detecting their change; the other consists of applying corrective changes. These two functions, one of indication and the other of regulation, are generally found to be independent, and in a given process, a number of ways may present themselves for carrying out either function.

The choice between the various ways of carrying out these functions and their last analysis are governed by a factor of time and a factor of simplicity. It is obvious that when obtaining a reading or in effecting a correction, a certain time must elapse between the occurrence of the change and the appearance of its effect in the process. It is equally obvious that the desirable variable to utilize for control would be the one in which this time factor is reduced to a minimum.

As an illustration of this, let us consider the result of a process whose ultimate object is the making of a certain quality and quantity of product. It is evident that, if we could control a process on the final results, it would be the simplest way to operate. From the point of view of operating control, however, examination of the product, whether periodical or continuous, is wholly inadequate to serve the purpose, since an appreciable time must elapse between the occurrence of a change and the detection of its effect in the product itself. The examination of the product indicates only past accomplishment and can serve only to confirm the fact that the apparatus has, or has not, been operated correctly during a period of time which is past and beyond recall. It can not serve as a guide for the future, but only for judgment of the past.

Indication for control, therefore, must be based on some variable encountered at a step in the process in advance of the finished product, and record a condition which is intimately connected with the result, changes in which may permit a timely corrective action On the other hand, as the desired indication is "advanced into the process," away from the final result, the more it will be complicated by other secondary variables which affect the product, and the more complicated will become the interpretation of its relation to the product, since other variables, although less important, will have to be considered in the analysis of the effect on the ultimate result. The choice of the variable for indication, therefore, must be a compromise between its factor of time and its factor of simplicity.

### Application in Cracking

In a cracking operation in which our information is obtained by means of pressure gauges, thermometers, level indicators, etc., placed at various points of the apparatus, it is obvious that we can obtain an almost unlimited amount of information by multiplying the number of instruments. This information, however, is not all of equal importance from the point of view of control, since many of the readings simply denote that parts of the apparatus, or auxiliary equipment, are functioning. We have learned that, in cracking, the product will be materially affected by the pressure and temperature in the system and that if we rely on the maintenance of this pressure and temperature, favorable results will follow. The readings of pressure and temperature anticipate the final result, since they are practically instantaneous and are, therefore, useful in control. They do not represent the whole story, however, since other secondary variables must be considered, but they present the best compromise between the factors of time and simplicity. Thus we may have on the control board readings of steam pressure, fuel supply, condenser water, etc., which merely denote that the apparatus can function and which do not directly affect the quality or the quantity of the product. On the other hand, the variations in pressure and temperature, which are also made to read on the control board, are carefully watched. We might conceivably dispense with the first class of readings, which are only of general interest, but we could not run the apparatus without specific information concerning the pressure and temperature, which may be considered indicating control factors.

The relative usefulness of information in the operation of a process is of immense importance, and constitutes a study in itself, specific not only to each process but each apparatus developed to carry it out. The primary requisites for control is evidently to choose the variable with which to operate. Skill in operation and technical knowledge must be relied upon to apply this pertinent information to obtain desired results.

The considerations governing the choice between different possible methods of applying corrective changes present a similar aspect. The effect of variations in the process should be prompt and should have an important effect on the product. Again, we have the necessity of compromising between the factor of time and the factor of simplicity, for usually, as we approach nearer to the direct effect on the product, we have combined with it the effect of secondary variables which complicate its action.

### Difficulties Encountered

If we consider, for instance, the control of temperature at the top of a tower, it is evident that this might be varied by changing the tower radiation by means of air passages and dampers, or by varying the supply of reflux. Both these methods are possible, but the effect of the first would not be realized for an appreciable period of time, while the effect of the latter, particularly if the reflux is at a low temperature, can rapidly and quantitatively vary the temperature at a desired point and cause practically the needed change, which is the result desired.

It is obvious that the second method of control is more appropriate since it has a more direct effect and, further, has the advantage that, from a point of view of simplicity, its action is very close to the result. The secondary variables which complicate its action are only the quality of the reflux and its temperature.

The ideal control scheme would be one where a single variable would give the desired indication of the result and a single variable regulated to effect corrections. In the rare instances where this is possible the problem of control is enormously simplified and can be accomplished by simple means. In practice, however, this can seldom be accomplished but it can be approximated, and one of the chief problems in working out a control scheme lies in stimulating this condition as far as possible.

As an illustration, we might consider a cracking furnace where fuel is admitted to a number of burners, where the temperature of the outlet of the coil has been found to be the proper indicating control and the rate of firing the regulating control. The fireman, in this case, is given an indicating temperature gauge and a recorder. He has a fuel line which is maintained at a higher pressure than the burners and has a series of valves operating these burners. As the temperature rises he cuts the fire and vice versa. The success of his firing will depend on the accuracy of the reading of the pyrometer and the way he effects changes. Should be pyrometer point become coked during the operation, obviously he will be given a false reading and lose control of his apparatus. Should he operate the burners individually, affecting his corrections at four or five points, it will be difficult for him to make accurate changes. On the other hand, should the flow to the still vary, or the pressure in the fuel main fluctuate, he will have to contend with disturbing elements over which he has no control. It is, therefore, necessary to devise some means whereby he may be given the proper facilities to maintain control of the furnace, and assume the responsibility for its actions.

### Pyrometer Couple

The pyrometer couple in coil heaters need not, necessarily, be placed at the outlet, but can be placed at some intermediate point, which can be found by trial. A reading at this point may be somewhat lower than the desired one but, if the

(Continued on Page 242)

*Before A.I.M.E., New York meeting.
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## Outlook Gives Every Promise Of Steady Improvement in 1928

By RICHARD AIREY
*President, Asiatic Petroleum Co.*

*The most encouraging feature for the ultimate success of refinery operations for 1928 is the splendid gasoline statistical position for 1927 arising from those refiners who manufactured and marketed a 400 degree Fahrenheit endpoint gasoline. This had the result of reducing the unwieldy stock of gasoline by 281,400,000 gallons during the year and provides 1928 an opportunity for great success. If those refiners who at present manufacture high endpoint grades of gasoline can see their way to adopt the 400 degree Fahrenheit endpoint policy, success is assured.*

*The effect of such support would relieve the anxiety which large stocks create and make for a better market. In fact, I can foresee the price of gasoline becoming self-sustained and not tied to the fluctuations of price and vagaries of production of crude.*

*The future is also bright for an increasing consumption of furnace oil. But here the market is one which is largely waiting to be developed. It is the duty of the refiner and marketer to lend every aid and encouragement to bring about the more universal adoption of oil fuel in the home. There is no reason why fuel oil cannot be developed into a large and profitable branch of the industry, so that the day may come when the fuel oil tank wagon may be as familiar a sight in our large cities and suburbs as the gasoline tank wagon is today. The demand for furnace oil will help the refiner by creating a wider market for his products.*

*The outlook for 1928 gives every promise of steady improvement.*

# BARCO Valves and Joints

## in refinery service

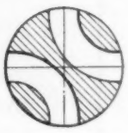
*Barco Plug Valves. Straight Screw Ends.*

THE advantages of Barco Lubricated Plug Valves exactly meet the requirements of many types of service in a refinery. Among the outstanding characteristics of this valve are the following:

No leaking or sticking.
Full opening at a quarter turn.
Satisfactory service when either full open or throttled.
Adapted to highest pressure or vacuum.

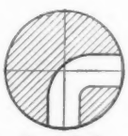
*Barco Plug Valve. Straight Flange Ends.*

Barco Joints solve many refinery pipe line problems. For swing joints on loading racks, for expansion joints in steam lines, and a score of other places, these better joints are preferred.



Detailed descriptions of either the valves or joints will be sent on request.

*Barco Standard Screw End Three-Way Valve.*



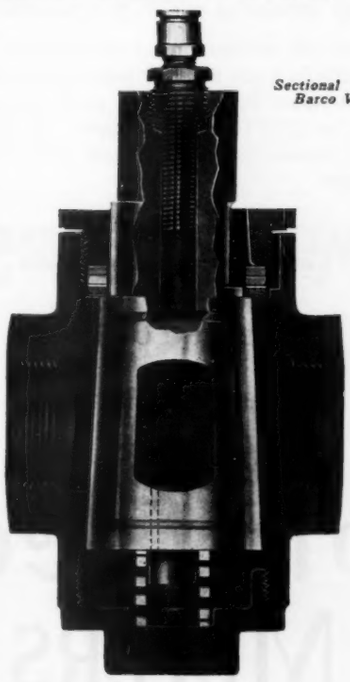
*No. 1 Style.*

*No. 2 Style.*

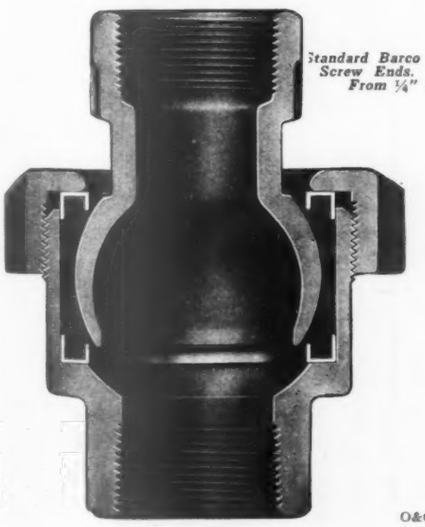
*Barco Standard Screw End Four-Way Valve.*

**Barco Manufacturing Company**
**1801 Winnemac Avenue, Chicago, Illinois**

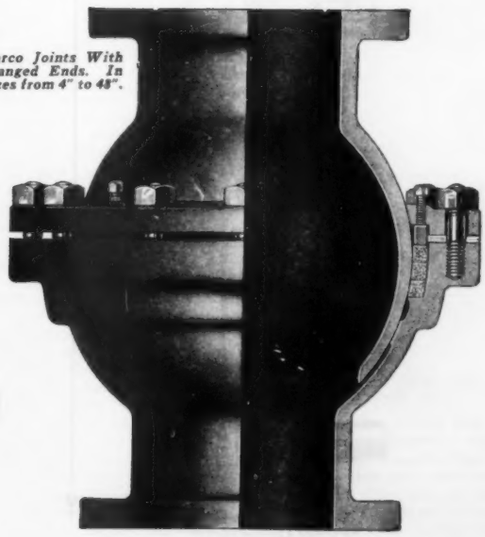
*Sectional View of Barco Valve.*



*Standard Barco Joint With Screw Ends. In Sizes From ¼" to 6".*



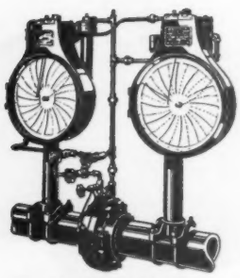
*Barco Joints With Flanged Ends. In sizes from 4" to 48".*



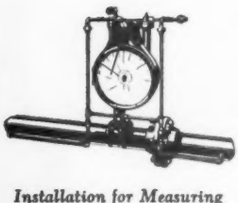
O&GJ 3-1-Gray

# There is a Particular Meter and a Particular Hook-up for all Measuring Jobs

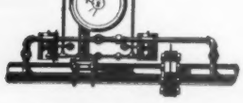
# *Using the Metric orifice*



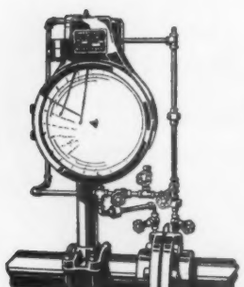
*Combined Installation for Measuring Variable Rates of Flow*



*Installation for Measuring Water or Light Oils—2½ and 8 Pipe Diameter Connections*



*Heavy Oil Measuring Installation*



*Installation for Gas (Flange Connections)*

METRIC orifice Meters are used for a greater variety of measuring duties than perhaps any other two or three types of meters in the production and initial distributing stages of gas and oil.

This meter is in the ascendency over all fields at home and abroad. It is the most used of all field meters of today because it offers the widest range of utility in its capacity for accurate measurement.

It's general simplicity wins new friends and new jobs constantly. The standard hook-ups shown here do not begin to represent the numerous types of installations for which this meter is being adapted. Orifice meter users are discovering and making ingenious hook-ups both in usual and unusual services, in regular and out-of-the-ordinary places, for new and strange jobs, until the manners and methods of its adaptations seem almost unlimited.

However, the certain basic rules to be followed in any installation of an orifice meter should not be violated. Only if correctly set can the meter render the satisfactory service of which it is capable.

A study of orifice meter measuring possibilities in your special work may reveal new avenues for accuracy and economy. We'll be glad to help, suggest, or advise, about installations, methods and service features.

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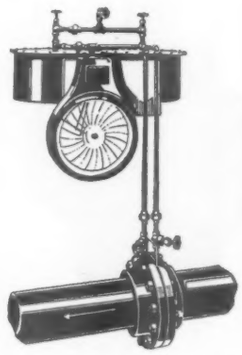
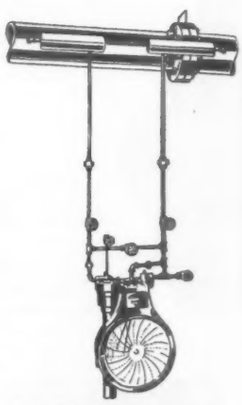
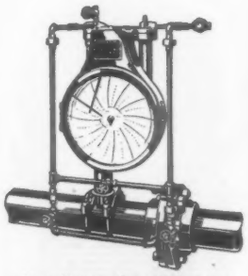
# METRIC orifice METERS



*Refinery Gas Meter for Low Differentials*



*Installation for Measuring Steam*



*Installation for Measuring Water or Light Oils (Flange Connections)*

# Distillation Methods and Processes

## Must Be Adapted to Crude Supply and Marketing Demands. Explain Advantages of Several Types

By Fred C. Koch
*The Winkler-Koch Engineering Co.*

The processes used in the distillation of petroleum and its products are so many and varied and overlap each other to such an extent that any attempt to classify them is difficult. The processes used by any particular refinery are the outgrowth usually of the type of crude run, the products made, and the marketing demands. It is particularly true in the case of smaller refiners that the equipment used must be sufficiently flexible to meet changing conditions of crude supply and the demands of the sales department.

The writer will attempt a classification of the more important processes in use, realizing that such a classification is only qualitative and is bound to be incomplete and not sharp and distinct.

First, let us consider pipe stills as applied to crude. These may be for merely skimming the gasoline, kerosene and a little gas oil out of the crude, or they may be required to distill 90 per cent of the crude overhead leaving a heavy tar and to fractionate the overhead into gasoline, kerosene, stove distillate, gas oil, and perhaps wax distillate.

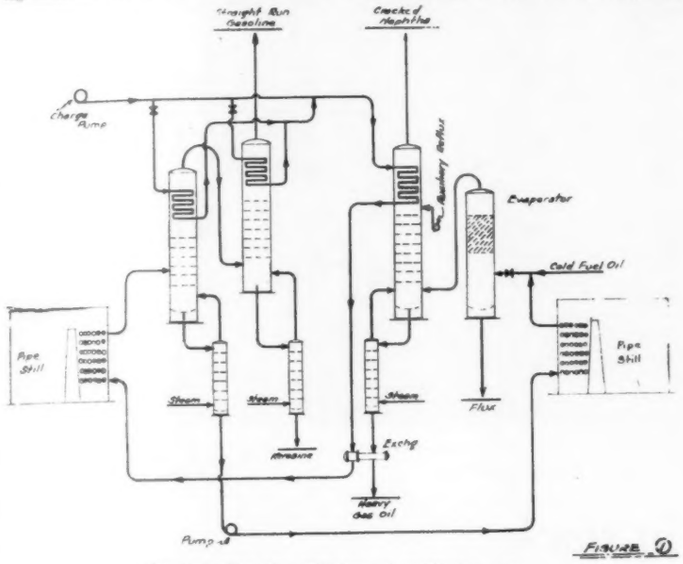



*Figure 1—Two-pipe still type of distillation unit.*

Let us take a case where we are to remove 90 per cent of the crude using two pipe stills shown in Figure 1. The advantages offered by this method are:

1. The straight-run gasoline and kerosene are removed at the lowest possible temperature thereby requiring a minimum of treatment; in fact, if complete heat exchange is resorted to, very little additional heat will be required to effect the distillation of the lighter products.

2. The cracked naphtha, amounting to about 5 per cent of the crude, resulting from the high temperature required to remove the gas oil is kept separate from the straightrun products.

3. A high yield of this cracked naphtha is obtained due to the high temperature of the gas oil distillation.

4. The towers required for this operation are small although more in number than in other methods.

5. Since the pipe still No. 2 will have to be cleaned oftener than No. 1, it is an advantage to be able to shut this part of the process down without materially interfering with the other operation.

In case two we do the same work as in case one, except in one pipe still and with one less tower.

The principal features of this operation are:

a. The distillation temperatures are lower than in 1, which makes this operation preferable when producing lubricating stocks, particularly when running to a cylinder stock bottom.

b. Since there is only one pipe still and a smaller number of towers, the control is easier.

c. There is no hot oil charging pump for a secondary pipe still which is always a nuisance and a bother.

d. It will not be necessary to clean this pipe still as often as the No 2 in Figure 1, since the tendency to coke is much reduced due to the lighter charge and the lower distillation temperatures.

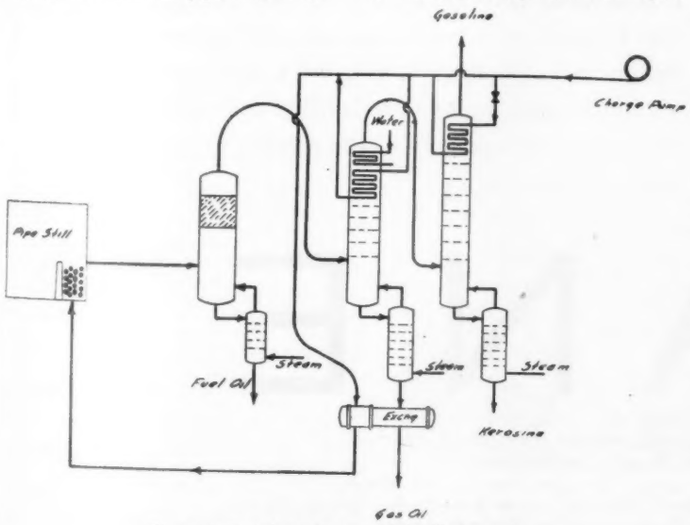



*Figure 2—One-pipe still type of distillation unit.*

### One Lower Distillation

In case three the work of distillation is done in one tower. There has been considerable discussion about whether fractionation of several products should be done in one tower or several. If the single tower installation is built properly it will be the equivalent of putting the several towers on top of each other. A single tower installation of this kind, Figure 3, requires the tower be the same diameter all the way up since the vapor load at both top and bottom does not vary widely. On a multiple tower installation where reflux condensers are used this is not the case, the vapor load being considerably greater in the first towers.

It is possible to recover more waste heat in a multiple tower installation by the use of reflux condensers since the temperature gradients are higher than in a single tower installation using open reflux.

On a single tower installation it becomes somewhat of a problem to regulate the amount of reflux sent down the column at the various points and the amount which is drawn off. If open reflux is used, the amount of gasoline overhead is very large requiring considerable condenser surface. The arrangement in Figure 4 is generally used where only gasoline is to be taken off the crude. It is probably true that a more complete yield of gasoline can be obtained by this method than by the two preceding ones, although it is certainly at an added fuel expense when pumping charges are considered.

In the first place the charge to the pipe still enters at a high temperature resulting in a high temperature flue gas leaving the heater. If an unusually large circulating rate is not provided for through the pipe still, the temperature of the oil leaving the heater will become very high.

It is impossible to take off a considerable percentage overhead in this manner since the temperatures at the bottom will become so high that coking will result. The direct introduction of crude into the tower will certainly result in plugging the tower sooner or later, particularly if some preliminary settling is not resorted to.

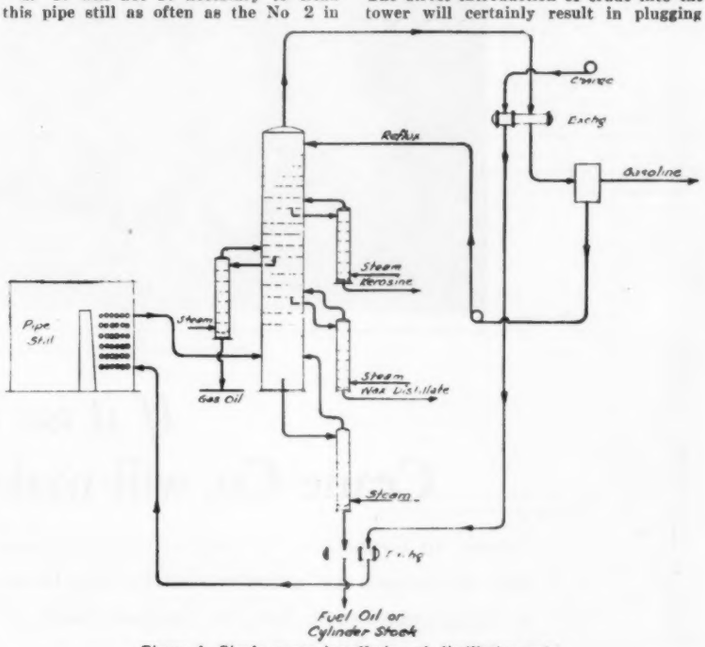



*Figure 3—Single tower installation of distillation unit.*

### Special Naphthas

In our next case, Figure 5, we have the production of very close cut products such as special naphthas direct from the crude by means of pipe stills. The resulting flow sheet becomes rather complicated. This arrangement has the advantage of producing very close cut fractions sharply separated from one another by means of pipe stills. However, it is complicated and requires a number of hot oil pumps. It is, of course, equivalent to

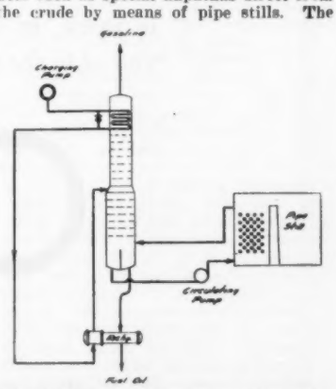


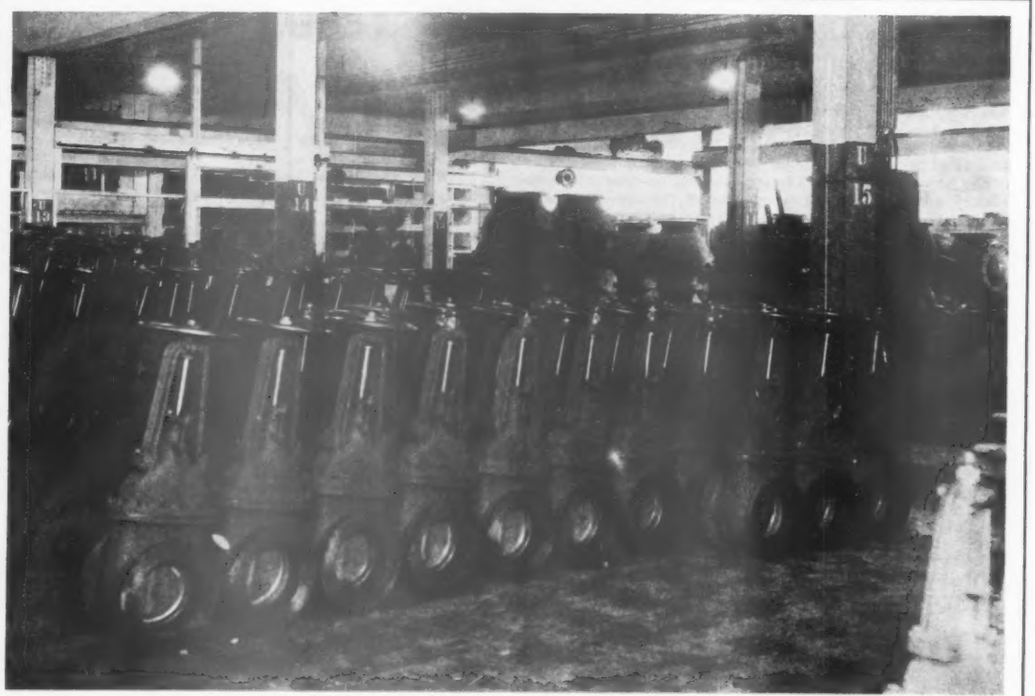

*Figure 4—Tower installation when only gasoline is taken from crude oil.*

(Continued on Page 241)

150 Pounds Pressure

# CRANE VALVES

2500 Pounds Pressure



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# Economic Outlook for Oil Exports

## Comprehensive Review of the World Petroleum Situation. Foreign Factors Affecting American Market

By John H. Nelson*
*Petroleum Section, Minerals Division, Bureau of Foreign and Domestic Commerce.*

An outline survey of the economic outlook for the United States export trade in petroleum products resolves itself broadly into two general divisions: First, a consideration of our present position in this trade, and second, a discussion of those factors now visible which promise to effect appreciable changes in the immediate future in that trade. Happily, however, this kind of a survey does not necessarily involve the presentation of a complete balance sheet of prophecies and anticipations. The most we can expect to do is to draw from available data some few reasonable inferences as to the probable course of events in the field which we are setting out to examine.

The contents of this paper are limited to a discussion of factors outside of the United States. The probable trend of American petroleum production, consumption, and the relation of export to domestic production, as well as a number of other elements of more intimate concern are not included in this survey. In departing from the statistical analysis and mathematical calculations which usually accompany a study of this subject, I should like to point out that those factors abroad which promise to have the greatest effect on the future trend of our petroleum exports do not permit at this time of such mathematical treatment with an appreciable degree of accuracy.

For convenience it is assumed that factors responsible for the continuing consumption of oil products abroad as well as in the United States will continue to function at a fairly constant rate. Our chief concern in this present study will be confined to the outstanding developments abroad which promise to affect our export trade immediately and intimately.

### Factors in Export Trade

We have attempted in this presentation to establish briefly our present position in the three immediate sections entitled:

A. 1. United States Petroleum Exports of Major Petroleum Products 1925, 1926 and 1927.

A. 2. Geographical Distribution of United States Petroleum Exports 1927.

A. 3. American Capital Investment in Petroleum Export Trade.

In section B we have listed the outstanding visible factors which will tend to change our present status in this trade. No attempt is made to evaluate these individual factors, which are as follows:

B. 1. Nationalistic Tendency From a World Standpoint Toward Legislative Control of the Oil Industry.

B. 2. Tendency to Develop Petroleum Refineries Outside of the United States.

B. 3. Russian Petroleum Exports.

B. 4. Petroleum Substitutes.

B. 5. Increased Crude Oil Production Outside of the United States.

B. 6. Closer Co-ordination of Foreign Competition.

A. 1. United States Petroleum Exports of Major Petroleum Products 1925, 1926 and 1927.

**Gasoline, Naphtha and Other Light Prod'ts**

| Quantity— | 1925 | 1926 | 1927* |
|---|---|---|---|
| gals. | 1,286,787,796 | 1,784,154,802 | 1,851,494,190 |
| Value | $197,491,588 | $262,199,938 | $214,721,652 |

**Illuminating Oil, Kerosene**

| Quantity— | 1925 | 1926 | 1927* |
|---|---|---|---|
| gals. | 885,136,041 | 924,680,979 | 827,162,280 |
| Value | $84,699,724 | $100,352,877 | $80,358,082 |

**Gas and Fuel Oil**

| Quantity— | 1925 | 1926 | 1927* |
|---|---|---|---|
| gals. | 1,365,358,988 | 1,449,688,394 | 1,815,130,464 |
| Value | $49,040,024 | $45,254,108 | $50,343,031 |

**Lubricating Oil**

| Quantity— | 1925 | 1926 | 1927* |
|---|---|---|---|
| gals. | 402,572,584 | 388,767,055 | 403,369,512 |
| Value | $90,596,671 | $86,414,621 | $88,926,815 |

*All 1927 12-months' figures estimates based on actual exports for the first 11 months of 1927.

It is perhaps unnecessary to point out that petroleum exports as a group have ranked consistently second among all major classifications of United States exports for many years, and first of all manufactured or processed commodities.

### Value of Exports

Based on the 11 months figures the total value of all petroleum exports for the calendar year 1927 will be $491,635,681, in comparison with $554,533,629 for the year 1926. Quantitatively, for the same periods our total exports of crude and refined products were 5,206,465,247 gallons and 5,451,896,159 gallons respectively. An increase in total quantity exported of approximately 4.7 per cent was accompanied by a decreased valuation of approximately 11 per cent, which was to be expected in view of the generally decreasing values of all petroleum products.

Of the calculated decreased valuation of all petroleum exports of some $62,897,948 in 1927, it is found that some $48,478,268 of this decrease, or about 78 per cent was contributed by one product alone, gasoline, having only $14,419,680 or 22 per cent to be contributed by all other exported products.

A. 2. *Geographical Distribution of United States Petroleum Exports for the year 1927.

**Gasoline, Naphtha and Other Light Products**

| | Pct. of Total |
|---|---|
| Europe | 68 |
| American Continent† | 15.6 |
| Far East | 10.6 |
| Africa | 4 |
| Other countries | 1.8 |
| | 100.0 |

**Gas and Fuel Oil***

| | Pct. of Total |
|---|---|
| Europe | 22.4 |
| American Continent† | 57.9 |
| Far East | 16.2 |
| Africa | .1 |
| Other countries | 3.4 |
| | 100.0 |

**Illuminating Oil (Kerosene)**

| | Pct. of Total |
|---|---|
| Europe | 46.6 |
| American Continent† | 8.1 |
| Far East | 35.5 |
| Africa | 5.2 |
| Other countries | 4.6 |
| | 100.0 |

**Lubricating Oil***

| | Pct. of Total |
|---|---|
| Europe | 66 |
| American Continent† | 12.6 |
| Far East | 14.9 |
| Africa | 2.4 |
| Other countries | 4.1 |
| | 100.0 |

*Based on 11 months' actual exports, does not include fuel or bunker oil laden on vessels engaged in the foreign trade, which aggregated approximately 50,000,000 bbls. for the year 1927.

†Includes all countries of North and South America, with the exception of the United States.

*Does not include 594,434 bbls. of black oils exported but not classified as to countries of destination.

### Refined Exports

Of the total of refined products of petroleum exported (includes gasoline, kerosene, gas and fuel oil, and lubricating oil) Europe received 47.3 per cent, or very close to one-half of our total exports. The remarkable differences between the percentages of our exports to Europe and all other geographical classifications, with the possible exception of the American continent, would tend to indicate at first glance a potential opportunity for the profitable development of petroleum consumption in those areas. However, a casual study of the economic status of those areas, taking into account population, standards of living, industrial status, highway development and other pertinent factors gives little prospect of any quantitative increased petroleum consumption of sufficient volume as to effect radical changes in the trend of our petroleum exports for many years to come.

### Investment Abroad

A. 3. An important factor commonly omitted in discussions of our oil export trade is the tremendous capital investment abroad necessary to carry on this trade by American oil companies, which investment distinguishes this export from practically all other major American exports. The exact figure of this investment is, of course, impossible to obtain. Several of the largest American oil companies engaged in large scale exporting have kindly furnished the author with estimates of the total amount of American capital devoted to foreign oil marketing operations. These estimates range from $1,100,000,000 to $1,500,000,000, and all are stated to be conservative rather than excessive estimates. Proof of a conservative nature of these estimates is indicated in the fact that reports from only five of the large exporting companies in themselves total $698,300,000. The natural reluctance with which the individual oil companies furnish figures on this subject prevents a further request for a detailed analysis as to the specific amounts invested in the different phases of the industry abroad, such as production, marketing, transportation and others.

The author's request to the specific companies furnishing these figures emphasized the interest only in the amount of capital necessary to conduct our oil export trade. Whether the replies were confined to this limit is exceedingly doubtful. For the purposes of this paper the total unqualified estimate is sufficient since as a whole it is directly affected by the same factors which we will discuss briefly as affecting the economic outlook for American export oil trade.

### Nationalist Tendency

B. 1. Nationalistic Tendency From a World Standpoint Toward Legislative Control of the Oil Industry. — The past few years have been marked by a progressively increasing nationalistic tendency to control on a world-wide scale and to regulate the petroleum industry by legislative enactments. The two most common forms of such legislation are the establishment of monopolies for the sale and distribution of all oil products and that form of legislation nationalizing petroleum production. In a number of cases the two merge to such an extent that to all intents and effect they are one and the same thing. In certain British and Dutch possessions conditions similar to nationalization and monopolistic control exist by reason of general national policy rather than specific act. A brief and far from exhaustive summary of these factors is outlined in the folowing paragraphs.

By royal decree of June 28, Spain has been the latest country to attempt a governmental controlled oil industry. On October 20, 1927, an exclusive monopoly for the importation, storage, distribution

(Continued on Page 249)

*Address before the American Institute of Mining and Metallurgical Engineers, New York, February 20, 1928.

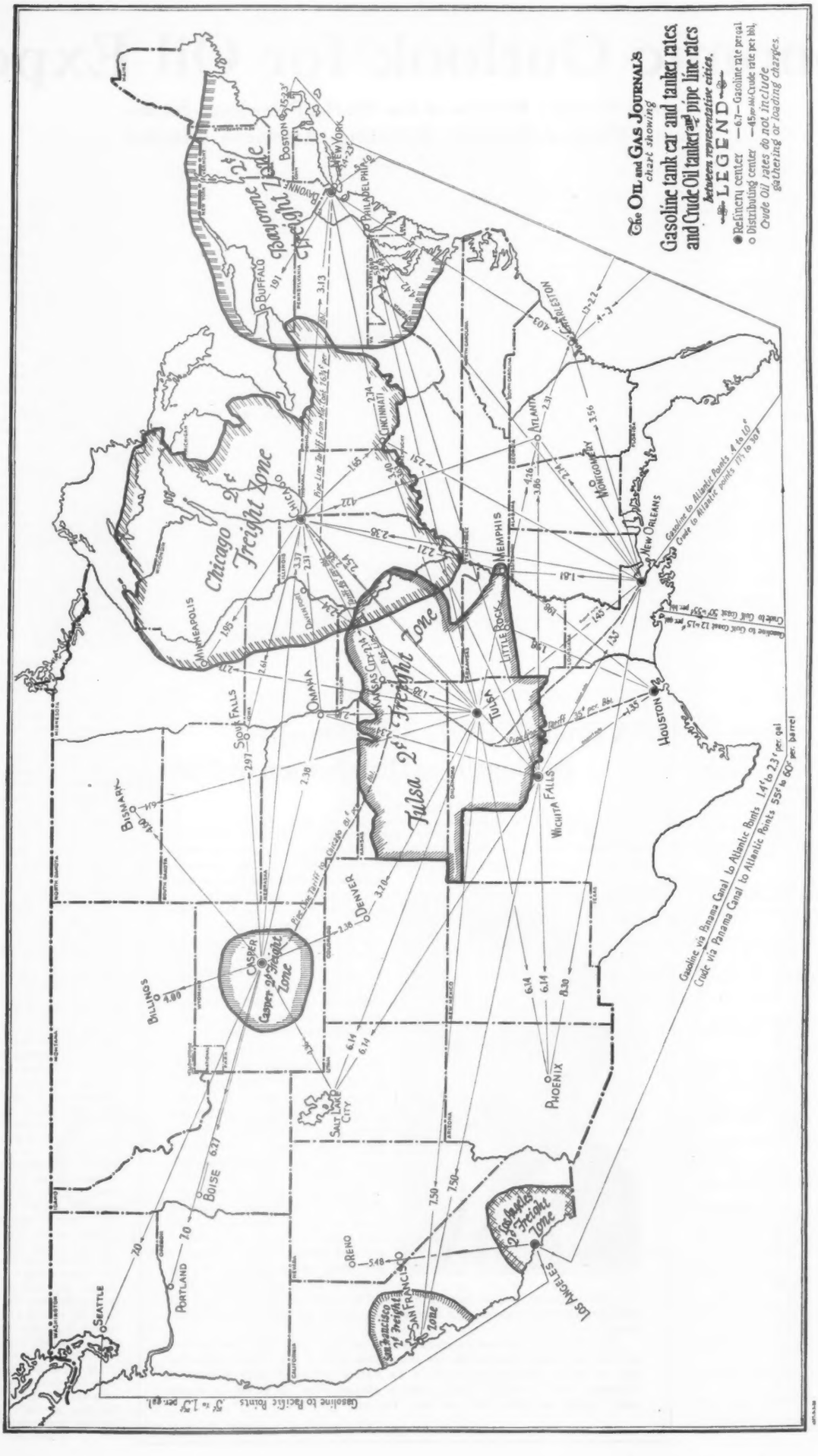
## "A Profit in Every Sale" Should Be Slogan for Distribution in 1928

By BERRY V. STOLL
*Vice President, Stoll Oil Refining Co.*

***I feel that the entire situation can be covered by the statement that the oil men as a whole have been too selfish. They cannot stand to lose an order. The producer cannot stand to think that someone might be getting some of the oil he might get if he pumps his wells a little harder. The refiner, if he loses one order, cuts his price lower to get the next and all along the line this selfish policy of not letting the other fellow have his share but cutting to get all of it, has demoralized prices and demoralized general conditions.***

***There is going to be a tremendous increase in the consumption of oil and gasoline. Cities are spending large amounts of money to put in the right kind of airports for airplane use. Read Lindbergh's book "We" and you cannot help but realize that the future year holds a new customer for gasoline. It only takes a straw to break a camel's back and if the various oil refiners and producers and jobbers were willing to get their share and not try to increase each year and sit idle for one year—it would not take long for consumption to catch up with production and for the whole industry to go back on a healthy basis.***

***The oil industry has as good brains in it as any other industry—in fact too good, and what we need now is for the whole industry not to be so progressive and to be better satisfied with a normal business and a normal profit, and a slogan like "A profit in every sale" would not be a bad one, or "Volume at a profit."***


The Oil and Gas Journals
chart showing
Gasoline tank car and tanker rates
and Crude Oil tanker and pipe line rates
between representative cities.
LEGEND
Refinery center —6.7— Gasoline rate per gal.
Distributing center —45 sec.— Crude rate per bbl.
Crude Oil rates do not include gathering or loading charges.
Bayonne Freight Zone
Chicago 2d Freight Zone
Tulsa 2d Freight Zone
Casper 2d Freight Zone
San Francisco 2d Freight Zone
Los Angeles 2d Freight Zone
Gasoline to Atlantic Points 4.6 to 10.6
Crude to Atlantic points 17.5 to 30.7
Gasoline to Gulf Coast 5.5 to 9.5 per bbl.
Crude to Gulf Coast 12.5 to 15.5 per bbl.
Gasoline via Panama Canal to Atlantic Points 14.5 to 23.1 per gal
Crude via Panama Canal to Atlantic Points 55.5 to 60.2 per barrel
Gasoline to Pacific Points 5.5 to 13.5 per gal.
BOSTON
NEW YORK
PHILADELPHIA
BUFFALO
CHARLESTON
ATLANTA
MONTGOMERY
NEW ORLEANS
CINCINNATI
CHICAGO
MEMPHIS
MINNEAPOLIS
OMAHA
SIOUX FALLS
KANSAS CITY
LITTLE ROCK
TULSA
HOUSTON
WICHITA FALLS
BISMARK
DENVER
CASPER
BILLINGS
SALT LAKE CITY
PHOENIX
BOISE
SEATTLE
PORTLAND
RENO
SAN FRANCISCO
LOS ANGELES

# Transportation Cost Fixes Markets

## Present Trend Toward Larger and More Scattered Refineries. Inland Water Transportation Receiving Attention

By W. T. Zeigenhain

Larger and more scattered refining units continue to be the trend in refinery operations and as marketing competition forces the adoption of the most modern and efficient processing methods along with quantity production to cheapen the cost of manufacture, a like amount of attention is due the transportation problem for it is the delivered cost that stands as the basis of competitive sales. It is an easy matter for a refiner to give a portion of his profit in the form of a freight equalization in order to move the product into disadvantageous trade territory simply because there is an attractive volume of consumption awaiting there.

Another noticeable trend is that refiners having marketing facilties are constantly increasing these, expanding their territory over relatively large areas either by building new or purchasing jobbing stations already established. The added outlet appears attractive on first thought but unless this property fits in with the general scheme of expansion, allowing equitable transportation costs, it can serve only as a dumping ground for excess production and could not be expected to pay a return commensurate with the balance of the company's facilities. This overlapping of marketing facilities is responsible, in part, for the increasing cost of marketing and, while competition serves to build rather than destroy over a long period of time, this competition might be made so keen as to eliminate a fair return and prove too great a burden to carry.

Thus transportation costs generally decide whether the expansion may be desirable and deserves more consideration than any other single factor. These costs occur day after day and amount to surprising amounts over a year, in many cases being many times what the refiner would consider a fair return on the investment. The customer pays the freight, it is true, but when the marketing division becomes the customer the factor of transportation becomes doubly important.

### Refinery Locations

There are logical refinery locations scattered over the United States and at the beginning of the industry these developed near the crude oil producing fields. Including shutdown refineries, this accounts for the 54 plants located in Pennsylvania, the 71 plants in Oklahoma, the 80 plants in Texas and the 74 plants in California. These four States have 60 per cent of the total number of refineries in the United States, while the total of 462 plants is scattered over 31 states. Originally, the production and consumption of refinery products did not justify refineries being built at great distances from the source of crude but as consumption increased, pipe lines were laid from the producing fields to these marketing centers and the crude piped and refined there in preference to paying the freight on the refined products.

This led to the laying of three pipe line systems to the Chicago area from the Kansas and Oklahoma fields and then prompted the laying of a line from the promising Wyoming producing fields to a point in Missouri to connect with one of these Chicago lines. With cheap water transportation reaching the thickly populated Atlantic Coast states eight lines were laid from various points in the Mid-Continent fields to the Gulf Coast to supply new refineries there or to enable the cheap transportation of crude to the Atlantic Coast plants. In addition, pipe lines were laid from the eastern states to connect with two of the Chicago lines. In effect, this system of lines has made possible the building of refining units at strategic marketing points and afforded quick service to consumers as well as cheapening the delivered cost. The railroads recognized the pipe lines as their competitors and adjusted rates where possible and there has been a constant revision of rates since.

**FREIGHT RATES IN CENTS PER GALLON ON GASOLINE TO VARIOUS POINTS**

| | From Bayonne, N. J. | From Los Angeles, Calif. | From Casper, Wyo. | From Tulsa, Okla | From Chicago, Ill. | From Houston, Tex. | From New Orleans, La. | From Wichita Falls, Tex. |
|---|---|---|---|---|---|---|---|---|
| New York, N. Y. | .... | .... | .... | 5.15 | 3.13 | .... | 4.42 | 4.49 |
| Philadelphia, Pa. | 1.06 | .... | .... | 5.02 | 3.00 | .... | 4.29 | 4.49 |
| Charles on, S. C. | 4.03 | .... | .... | .... | .... | .... | .... | .... |
| Atlanta, Ga. | .... | .... | .... | 4.26 | 4.22 | .... | 3.74 | 3.86 |
| Memphis, Tenn. | .... | .... | .... | 1.88 | 2.21 | 1.98 | 1.81 | 1.98 |
| New Orleans, La. | .... | .... | .... | 3.00 | 2.54 | .... | .... | 3.18 |
| Cincinnati, Ohio | 2.74 | .... | .... | 3.40 | 1.65 | .... | 2.51 | 3.63 |
| Chicago, Ill. | 3.13 | .... | 3 37 | 2.38 | .... | .... | 2.38 | 2.54 |
| Minneapolis, Minn. | .... | .... | .... | 2.77 | 1.95 | .... | 2.46 | 2.94 |
| Omaha, Neb. | .... | .... | .... | 2.18 | 2.31 | .... | 3.56 | 2.34 |
| Kansas City, Mo. | .... | .... | 2.97 | 1.78 | 2.14 | .... | 3.17 | 2.05 |
| Denver, Colo. | .... | 6.99 | .... | 3.20 | 5.35 | .... | 4.88 | 3.20 |
| Houston, Tex. | .... | .... | .... | 3.00 | 5.28 | .... | .... | 2.61 |
| Salt Lake City, Utah | .... | 4.82 | 4.36 | 6.14 | 8.25 | .... | 8.30 | 6.14 |
| Seattle, Wash. | .... | 5.94 | 7.0 | .... | .... | .... | .... | .... |
| San Francisco, Calif | .... | 2.38 | .... | 7.50 | 8.70 | .. | 8.30 | 7.50 |
| Los Angeles, Calif. | .... | .... | .... | 7 50 | 8.70 | .... | 8 30 | 7.50 |
| Phoenix, Ariz. | .... | 5.28 | .... | 6.14 | 8.70 | .... | 8.30 | 6.14 |
| Buffalo, N. Y. | 1.91 | .... | .... | .... | .... | .... | .... | .... |
| Little Rock, Ark. | .... | .... | .... | .... | .... | 1.98 | .... | .... |
| Montgomery, Ala. | .... | .... | .... | .... | .... | 3.07 | .... | .... |

### Railroads' Position

Those refiners located in areas where production exceeds consumption are naturally trying to extend their marketing territory by securing lower freight rates into the thickly populated areas and on the other hand, the railroads have generally contended the existing rates are such as to afford only a bare operating margin of revenue. When this point is reached it must be recognized and the logical marketing territory for a refinery center is then defined.

Accompanying this article is a map of the United States showing the freight rates from various refining centers to major consuming points and also roughly outlines the 2-cent freight zone from several of the larger refining centers. The 2-cent freight zone is taken as the territory having a freight rate on gasoline from the respective refinery center of 2 cents or less. As an example, gasoline may be shipped from Bayonne to any point in the area surrounded by the heavy line which cuts the lower portion of Maine and encloses New Hampshire, Vermont, New York, Pennsylvania, etc. A 2-cent freight zone was taken, for this pretty well defines the logical marketing territory of the respective refinery centers and any refined products moved into this territory from another is at a disadvantage and will meet new competition. But in some cases the consumption within the 2-cent zone exceeds its refinery production and the deficit must be made up from the outside. This is true of the 2-cent freight zone from Chicago.

The estimated consumption within the Chicago 2-cent zone is 3,088,000,000 gallons annually while the production in this same territory approximates 1,733,300,000 gallons, leaving a deficit of more than 1,000,000,000 gallons to be supplied from the Mid-Continent and other refining areas where production exceeds consumption. The amount of the excess in the Mid-Continent, considering only the territory within the 2-cent zone from Tulsa, amounts to a little more than 1,350,000,000 gallons, the major portion of which finds its way into Minnesota, Iowa, Illinois, Michigan and Ohio, the territories more cheaply reached from the Chicago refineries. In addition to this excess in the Tulsa territory, there is a substantial excess production from the North Texas refining area which, too, must find an outlet and part of it goes into the Chicago territory.

The other major outlet for this excess production is through the Gulf Coast shipping terminals where it is loaded on tankers and taken to Atlantic seaboard points. This movement is in competition with shipments made from California by way of the Panama Canal and in the more recent months, in competition with Venezuelan and Mexican gasoline. This has made Atlantic Coast points the dumping grounds for distress material. These shipments are well distributed along the entire coast reaching from Savannah, Ga., to Boston and shipments are even made into the immediate territory of the Bayonne refining center.

Consumption within the 2-cent freight zone from Bayonne exceeds the production in this territory by approximately 450,000,000 gallons annually and while this is not much in comparison to the total consumption in this territory, it does supply a market for some surplus Gulf Coast, California and foreign gasoline. It also supplies a market for outside gasoline for the reason that large quantities of gasoline are shipped to European countries from Bayonne and other points which must be replaced.

### California Situation

The 2-cent zones surrounding Los Angeles, Calif.; San Francisco, Calif., and Casper, Wyo., are very much smaller. This is justified by the railroads due to the lesser volume of oil moved by rail. Production of gasoline in each of these centers far exceeds the consumption within their 2-cent freight zone as might be expected. In the case of the California refining centers, the production jointly amounts to approximately 2,100,000,000 gallons a year while the consumption for the three Pacific states only slightly exceeds 1,330,000,000 gallons. The bulk of the balance is moved to the Atlantic Seaboard or is exported to foreign countries.

Freight rates on products moving by rail east from California take a high rate as may be seen from the map but this territory intermediate to California and the Mid-Continent and Casper refining centers, all takes a relatively high rate from all refining centers because of the low concentration of population and consumption. This situation is conducive to the establishment of numerous small plants wherever there is a sufficient supply of crude. Scattered plants throughout Montana, Wyoming, New Mexico, Colorado, Utah and Arizona supply this vast territory. The latest move to augment the production in this territory is the announcement of the building of a 10,000-bbl. refinery by the Pasotex Petroleum Co. (Standard Oil Co. of California) at El Paso, Tex., and the building of several smaller plants near the

(Continued on Page 142)

## Must Think in Terms of Net Profits Rather Than Gallonage

By THOMAS J. HILLIARD
*President, Waverly Oil Works.*

*The thing which impresses me most about the situation right now is the turmoil and chaos which exists in the distributing end of the business. The fact that refiners and distributors are competing so keenly for gallonage and ready to make any kind of concession and spend any kind of money for an account, seems to forecast nothing but financial suicide for many. The answer seems to be that refiners and distributors must give more thought to profits rather than to gallonage, and until this is done, the marketing situation is going to remain a serious and an everlasting menace.*

*All refiners know that we do not sell one more gallon of gasoline at today's prices than we would if the prices were on a basis which would return a fair profit, and again it comes down to a point of whether we want to think in terms of barrels run rather than in net profits.*

# Analysis of Present Fuel Situation

## Overproduction of Past Year Responsible for Low Prices, Which Will Greatly Stimulate Consumption

By Arthur Knapp*
*Petroleum Engineer, The United States Gas Improvement Co.*

The economics of fuel oil must be considered in two aspects; viz., fuel oil as one of a number of competitive fuels and fuel oil as a refined product of petroleum.

"Fuel oil" is usually defined as that product of petroleum which is used in furnaces for the generation of heat by simple combustion. It is true that any product of petroleum used in an internal combustion engine is essentially a fuel oil, but such oils are not included in the class known as "fuel oil".

**Fuel Oil as One of Several Fuels**

For a number of years, the petroleum industry has believed that the petroleum reserves were very limited and that petroleum products would begin to become scarce within a few years. The industry has believed that there would be a gradual but continual rise in prices as a result of this impending scarcity.

The industry, therefore, has informed the users of fuel oil that, once they were eliminated by price, they were eliminated for all time. The petroleum industry believed and made the consumer believe that there would never be any appreciable recession in price which would make it worth while for any consumer of fuel oil to resist elimination with the expectation of future lower prices.

The effect of this attitude toward the future of the fuel-oil market is shown by the trend of consumption of fuel oils by the railroads and by public utility power plants generating electric power.

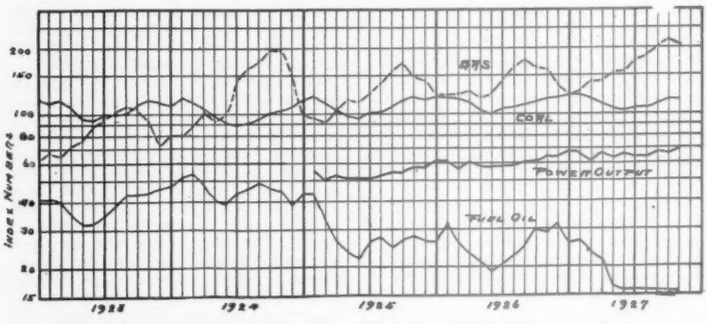


*Figure 1—Daily average consumption of fuels by public utility power plants.*

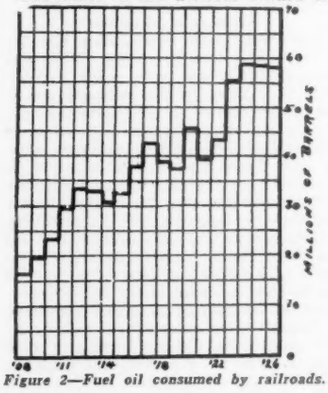


*Figure 2—Fuel oil consumed by railroads.*

On Figure 1 are plotted the fuels consumed by public utility power plants. The decrease in the fuel oil used may be partly the result of increased efficiency of use. If the price of fuel oil alone was the factor governing the major portion of the decreased use, the curve of consumption should bear some relation to price. However, the major influence has been the fears of the consumers that fuel oil prices would continue to rise, and they have offered no resistance to elimination as fuel-oil users as soon as the price became too high.

Figure 2 shows the consumption of fuel oils by railroads. The railroads have had the same feeling regarding the fuel-oil situation as have the public utilities. The increase in the efficiency of use, which has been brought about by the railroads, would have built up considerable resistance against elimination had the railroads been given reasonable assurance that price recessions might be expected.

The railroads and public utilities producing electric power together consume at least a quarter of the fuel oil marketed. They have a common problem of purchasing. They cannot make immediate adjustments of the selling prices of their services and are, therefore, primarily interested in a stable market. They require long-time contracts and these are the principal reasons why they have been more interested in coal than in oil.

Another 20 per cent or more of the fuel oil produced is consumed as bunker oil. The intensive competition to be found in ocean transportation, coupled with the slowness with which it is possible to adjust ocean freight rates, make it imperative that shipping companies shall also have a stable fuel market.

Another 10 per cent of the fuel oil produced appears in the statistics as exported. The greater part of this is also used in vessels and may be considered under the heading of bunker oil.

In other words, over half of the fuel oil sold is sold in competition with coal and gas, not only on a cost basis, but also on the basis of stable markets and long-term contracts.

The petroleum industry uses at least one-eighth of the fuel oil produced. Even in this use, coal is sometimes a competitor and gas is coming more and more into use, to the elimination of fuel oil. Petroleum coke is also a competitor.

About 16 per cent of fuel oil is consumed without severe competition at the present time because of its superior qualities in heat treating smelting, cement burning, etc. This is a passing phase, as gas and powdered coal are being developed and will be serious competitors of fuel oil, particularly in large plants. The plant investment required for gas production or powdered coal use has been a handicap which is being overcome.

Of the remaining 20 per cent (approximately), the gas companies consume about 6 per cent in the production of manufactured gas. The manufactured gas industry as a consumer is gradually being eliminated by improvements in process. These improvements are the result of research under the threat of a continual increase in price.

About 4.5 per cent is used for heating houses and office buildings. Coal is not a serious competitor of fuel oil for heating office buildings, because of the extreme convenience of oil as a fuel. For dwelling houses, coal is always a competitor except for those who can afford to pay for the convenience of oil fuel. Domestic gas is coming more and more into the field and as soon as gas distributors can find some economic solution to the problem of overload which gas house-heating produces, domestic gas will be a serious competitor of fuel oil for heating dwellings.

**Fuel Oil as a Petroleum Product**

Fuel oil occupies a unique position among petroleum products since it is, in general, the residue of refining operations. It is also unique in that increased efficiency within the industry nearly always results in a decrease in the consumption of fuel oil. The use of gas under field boilers and the electrification of drilling and production operations result in fuel-oil economy. The use of refinery gas under stills and the introduction of heat exchangers result in further fuel-oil economy. The use of internal combustion engines for drilling, pumping wells, pipe line pumps, and tanker propulsion, all mean less fuel oil consumed.

Only one thing has worked toward a decrease in the fuel oil available for marketing, and that is cracking. The overmanufacture of gasoline has been so extensive and so prolonged, however, that the economic balance between outputs and prices of gasoline and fuel oil has never been established.

Figure 3 shows the ratio of fuel-oil price to gasoline in Group 3 territory during the past five years. The trend of this ratio is upward, showing that fuel-oil prices have consistently increased as a proportion of gasoline prices over this period. It is doubtful if the economic relation of these prices is a proportion. It is more probable that it is a difference.

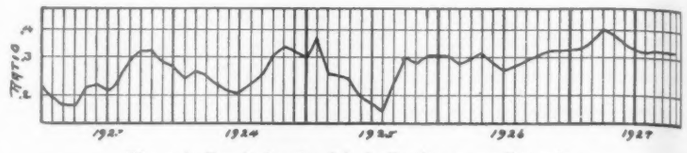


*Figure 3—Trend of ratio of fuel oil price to gasoline price.*

Figure 4 shows the difference between the price of gasoline and that of fuel oil and ga soil in Group 3 during the past five years. Previous to the advent of cracking, there was a wide difference in price between gasoline and fuel oil, a difference that declined rapidly to an amount approximately equal to the relative value of fuel oil as such or as gasoline. This relation has not held in 1927 because of the general demoralization of both markets. During the past year, the difference has been decidedly in favor of selling fuel oil as such rather than cracking it into gasoline.

**Statistical Analysis**

It is impossible to go much further into the economics of fuel oil because of the lack of detailed statistics. Figure 5 shows the net stock changes of gas oil and fuel oil held at refineries east of California as reported by the American Petroleum Institute. In the past three years 16,456,000 bbls. of gas oil and fuel oil have been added to the accumulations of the previous years (to December 1, 1927). This is 50 per cent of the total stocks of all oils accumulated by refineries during these three years. During this same period, there was a draft of 1,923,000 bbls. upon the stocks of gasoline previously accumulated.

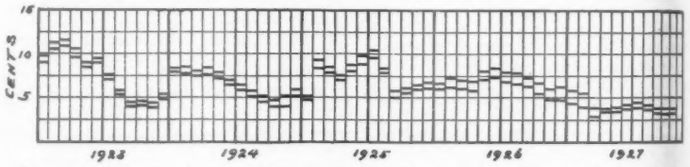


*Figure 4—Difference between Group 3 gasoline price and fuel oil price (upper line). Difference between gasoline and gas oil (lower line).*

It is impossible to make an accurate statistical analysis of the national situation. All classes of fuel oils are reported under one heading and, in addition, California nonrefinable crudes are reported with the fuel oils of that region. Because of the extreme flexibility of modern transportation, particularly ocean transportation, the national situation should be considered, and it is unfortunate that more detailed statistics are not available. It would be particularly useful if all fuel oils close to the seaboard could be considered in one study but such statistics are not available except

(Continued on Page 149)

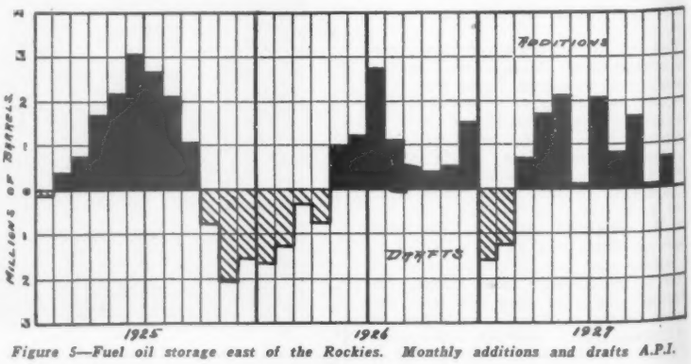
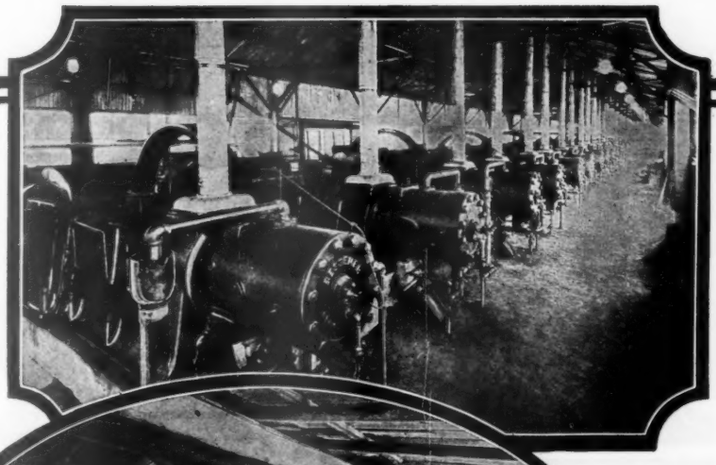
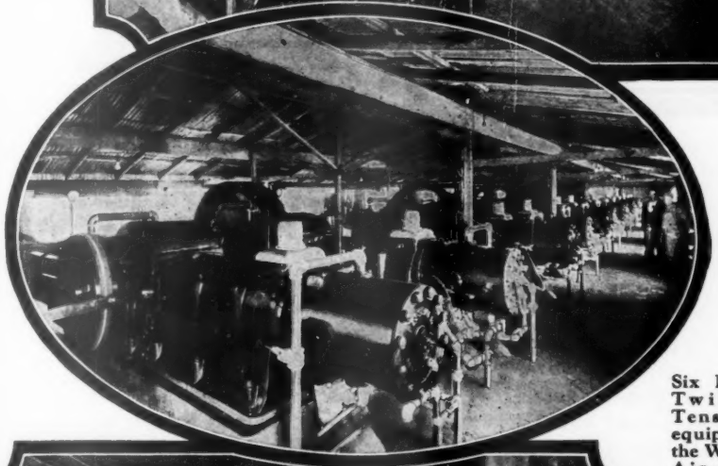


*Figure 5—Fuel oil storage east of the Rockies. Monthly additions and drafts A.P.I.*

*Paper presented at New York meeting, A.I.M.E. Copyright, 1928, by the American Institute of Mining and Metallurgical Engineers, Inc..



In this Air-Gas Lift Plant of the Magnolia Petroleum Co. in the Earlsboro, Seminole field there are 14-165 H. P. Bessemer Twin Type Tens.



Six Bessemer Twin Type Tens are the equipment in the Wadsworth Air-Gas Lift Plant of the Mid-Continent Petroleum Corporation.

Eighteen 165 H. P. Bessemer Twin Type Tens in the Carter Oil Co's Stewart gasoline plant, Seminole field.

The four Bessemer Twin Type Tens in a plant of the Wilcox Oil & Gas Co., Seminole, Okla.

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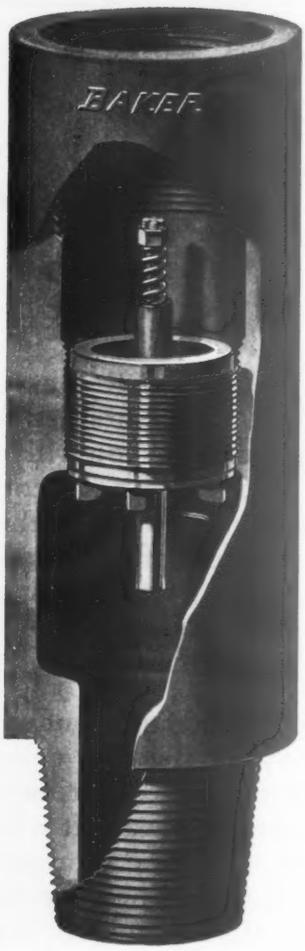


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# Uncharted Potential Oil Markets

## Establishment of a Consistent Sales Policy Declared Dependent Upon Reasonable Solution of Production Problem

By W. R. Boyd, Jr.,*
*Assistant Secretary and Counsel, American Petroleum Institute.*

As marketers you are part of an eleven billion dollar industry, the business of which is to supply a world with the products of petroleum. Your prosperity depends, in part, upon that of your industry.

Production of the raw material is the Alpha of the oil business. Without raw material there could be no marketable product. Marking is the Omega. Refining and transportation are the intermediary stages between the two extremes. All are essential. Combined they comprise what we call "the oil industry."

Speculation about the possible exhaustion of the supply of raw material has been rife. Likely there will be speculation about that 500 years from now. By this remark I do not mean there is no production problem. Obviously any real shortage in fuel and lubricating oil and gasoline under present conditions, would be a national calamity.

The President, in December, 1924, appointed a Federal Oil Conservation Board to make certain investigations in relation to supply. This board has submitted two sections of its report. The second section is dated January 16, 1928, and deals with the development of shale oil and possible petroleum substitutes.

It is known that a certain but more or less indefinite number of billion barrels of crude oil are yet unrecovered from discovered pools. It is assumed that many other new pools containing many billion barrels of oil will be located and developed.

### Future Supply

The second section of the report to which I have just referred estimates a supply, additional to that mentioned, which can be recovered from domestic oil shale, if and when the price warrants its extraction, of 92,000,000,000 bbls.—nearly 10 times the total quantity of oil that has been produced in the United States from 1859 to date. At our present rate of production from wells, this quantity would suffice for roundly 100 years.

The estimate is made that the two and one-half trillion tons of bituminous, subbituminous and semibituminous coal in the United States, within 3,000 feet of the surface, is capable of yielding about 92,000,000,000 bbls. of motor fuel—more than 300 times the motor fuel production in 1927. It is also estimated that another 12,000,000,000 bbls. of motor fuel may be obtained from the 940,000,000,000 tons of lignite deposits in this country.

This would make available an estimated total quantity of 104,000,000,000 bbls., or 4,264,000,000,000 gallons of fuel for motors in addition to the numerous billion barrels of crude oil from wells and oil shales.

If the estimates which the board has presented prove to be anywhere within shooting distance of the correct figures it would seem that, petroleumly speaking, the world could somehow manage to get along quite comfortably for a few more generations and that getting the supply is not merely a physical problem but a mixed problem of recovery and economics. It is needless to point out that to obtain supplies from either oil shale or coal involves mining operations plus relocation of refineries and new methods of extraction and processing manufactured petroleum products.

### Production Problem

Substantial progress has been made in the art of finding new oil pools. Producers know better now how to recover and handle the oil once it is located underground. It is but natural that we should be breaking all production records.

The oil producer is discussing two important questions: How may we secure more orderly production and obtain greater ultimate recovery? How may we get a fair profit from our enterprise? The best, and the worst, and all the in-between minds in the business are wondering how to improve methods of capturing oil or conserving it in its native reservoirs. Suggestions are being offered and analyzed. All of them are earnestly purposed.

The production problem is not local nor is it restricted to the man who produces crude oil. It is one for national and industrial concern. The merchandising division of the industry has been under a handicap, to expand normally its markets. The reason why is that the question of obtaining sufficient crude oil supply to meet tremendously increased demand, particularly for gasoline, has been uppermost. This prompted the Federal Trade Commission, in a report issued last December, to point out that rising prices for crude oil and gasoline at the opening of each of the five years 1922 to 1926, inclusive, had as their genesis a general anticipation that crude oil supply would be insufficient. But invariably overproduction followed.

### Need for Consistent Sales Policy

The establishment of a consistent sales policy is dependent in part upon some reasonable solution of the major production problem. So much has been learned in recent years as to oil sources and recovery methods, through bitter experience and brilliant technological application, that combined with the awakening consciousness favoring co-operative enterprise to effect stabilization of a naturally fickle raw material, the industry may well consider that large supply is available and adjust its merchandising policy to conform.

The scientist and the inventor are constantly adding to our store of knowledge. They are not merely devising in the ordinary way; they are modernizing, systematizing and revolutionizing. Some of them are at work for us seeking more efficient and less costly ways to get more oil. Others are co-operating to check wasteful practices in utilization so that less oil will be consumed.

Technological skill and genius, representative of the consumer of our products, are occupied in looking for ways and means to use less oil at less cost. They will succeed in some measure.

Improvements in motor car construction are certain to increase the number of miles per gallon of gasoline. An increase of even 25 to 40 per cent is promised. Everybody is contributing to the education of the motorist to conserve motor fuel. If and when he really wants to save motor fuel, a way will be found to do it, and the consumption of gasoline will be reduced proportionately.

In November, 1922, the all oil storage amounted to 382,095,000 bbls. In November, 1927, it aggregated 581,830,000 bbls. The increase was 199,735,000 bbls., or 52 per cent. Not so large in terms of daily consumption, nevertheless it was, and is there ready for markets that are not ready to absorb it. "Every little bit added to what you got makes just a little bit more."

### Gap Between Storage and Demand

During the month of November, 1922, we produced and imported 56,393,000 bbls. of crude oil. During November, 1927, the production and imports amounted to 80,266,000 bbls., an increase of 23,873,000 bbls., or 42 per cent.

Five years ago, in the month of November, 1922, the consumption of all oil was 53,826,000 bbls. In November, 1927, it was 75,077,000 bbls., an increase of 21,251,000 bbls., or only 39½ per cent.

The gap between percentage of increase in storage and percentage of increase in consumption expands rather than contracts.

There are some factors in the oil business that defy analysis. About them we can evolve wonderful theories but we have no means to know whether any of them are right or wrong. There are a few fundamentals that endure. One is that the relation between supply and demand may vary but the economic law which governs, never varies. The effect of this law on the nerve-center of business, namely, the pocketbook, is very well known to every oil man.

"Physician heal thyself" is a good motto for any industry!

On one occasion an intrepid oil man indulged himself in prophecy which he afterward said produced a number of unsolicited testimonials. Tucked away in one of his paragraphs may be found this significant sentence:

"With the uncharted potential market that is waiting it would seem safe to say that the only limit to the amount of petroleum that can be disposed of will be the amount that can be obtained."

This was no mere flight of rhetoric. It was a long-range view of the future of the petroleum industry. This oil man, from the depths of his experience and the knowledge of his business, was looking forward to the time when discovery of new and diversified uses would increase enormously the consumption of the manufactured products of a barrel of crude oil.

### Gasoline Disposal Still Problem

"The uncharted petroleum market that is waiting!" is a good text for an oil sermon.

Thirty years ago the disposal of gasoline was a serious problem to refiners. It still is. Then it was a by-product and disposal meant its physical waste. It cost good money to waste it. It still does. Nevertheless we have made progress. The discovery of a use for it was promptly followed by an increasing demand which rapidly grew to enormous proportions. Now the gasoline bill of the nation is a recognizable item in the national budget.

Only a few years back it was discovered that gas oil would enrich the product of the artificial gas manufacturer. He had to be shown and educated before he would use it. But this may even now be a declining market.

Not so long ago the fuel oil market was largely a potential one.

Only a short while ago the oil burner distillate market was an uncharted potential market. Now it is estimated that at

(Continued on Page 141)

*Before Ohio Petroleum Marketers Association, Columbus, Ohio, February 22, 1928.

## New Uses, Enlarged Markets, Not Cut-Throat Competition

By H. D. FRUEAUFF
*Henry L. Doherty Co.*

*The outlook of the oil industry for 1928 looks particularly bright to me because I believe there is a better realization by the executives of the major oil companies of why oil should be produced, as indicated by the work of the Board of Directors of the American Petroleum Institute in appointing committees to study and foster marketing problems.*

*This is a big step forward. When the industry realizes, as they apparently are more and more, that the ultimate field is beyond our possible conception, but that much additional consumption of all of the products can be gradually, in some cases rather quickly, developed by concentrated effort, particularly can this help during 1928, if the heavy ends of the barrel of crude are particularly worked on to find a good market. This is offered through increased use of the oil heater for homes, buildings and factories.*

*The unfortunate showing of many companies in an earning way for 1927 is suggesting that it is not barrels of crude produced or gallons of gasoline sold that will keep their stockholders satisfied. It is suggesting more and more, and should through 1928, that the competition be of plans to develop new uses and enlarged markets rather than in competitive cut-throat efforts. The curtailment of oil production certainly will help, but it cannot and should not help alone, the business should be made expanding by increasing the possible uses and possible consumption so that the more quickly the problem can be changed from one of overproduction and overstorage to one of continued effort to produce as the market logically and profitably can absorb.*

# Proper Application of Radiant Heat

## Correctly Utilized It Has Many Advantages in Applying Heat to Petroleum Products. Fuel Economies Result

By A. E. Nash*

The title of this paper "Screened Radiant Heat and Its Application to the Petroleum Refining Industry" is somewhat of a misnomer, because it does not accurately describe the phase of heat generation and application coming within the scope of this discussion. This paper is concerned primarily with that particular phase of radiant-heat transfer sometimes erroneously referred to as "shielded" radiant heat, to differentiate it from the open radiant heat of either flame or settings, in which the actual source of the radiant heat is a small incandescent furnace composed of a highly conductive superrefractory, within whose walls the combustion of the fuel is completed. This small furnace is usually located directly in the furnace proper, and although its refractory walls do shield the heat-absorbing surfaces from contact with the gases of combustion, there is no interference with the radiant heat given off by the furnace itself. We do not believe it either necessary or advisable to shield or screen radiant heat when properly controlled and applied. We do believe it essential to prevent the excessively hot gases of combustion from coming in contact with those parts of the heat-absorbing structure that are already receiving heat at high rates by radiation. In connection with any process for the refining of oil which we are familiar, we are convinced that it is most advantageous to transfer the maximum of the heat generated in the form of radiant heat, applied directly to the heat-absorbing surfaces without the interposition of any form of shield or screen to prevent or reduce the radiant-heat transfer.

While the term radiant heat is broadly used to cover all heat energy transferred from one body to another by radiation, in contradistinction to heat given up by gases in direct contact with the heat-absorbing structure (convection) or transmitted simply by conduction, in furnace work it is perhaps more often limited to the heat rays given off either by the gases or the refractories used in the furnace construction, which are themselves at sufficiently high temperatures to show "color". Such energy rays approach the ultra-red rays, and in general act according to the laws which govern such light rays.

**Former Objections to Radiant Heat**

It is generally conceded that radiant-heat rays travel in straight lines, and that the intensity of the rays from any one point varies inversely as the square of the distance. It should be remembered, however, that in a furnace setting the radiant heat is confined within the walls of the furnace, and is reflected and reradiated from point to point, until ultimately taken up by the heat-absorbing structure, lost either by conduction through the ground and setting, or carried away by the combustion gases. This condition, therefore, tends to equalize the actual rate of transfer, and the relative distance between the primary source of heat and the heat-absorbing surface is of minor importance.

The rate of transfer then depends primarily on the temperature differential, and as expressed by the Stefan-Boltzman law,

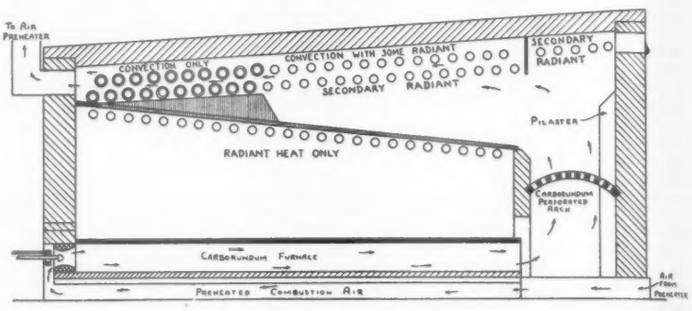
$$H = 1600 \left[ \left(\frac{T^1}{1000}\right)^4 - \left(\frac{T^2}{1000}\right)^4 \right]$$

where H equals the heat in B.t.u.'s per hour, and $T^1$ and $T^2$ the respective absolute temperatures in degrees Fahrenheit. It should be noted that the rate of transfer, which varies with the fourth power, is very greatly affected by the relative temperatures, and extremely high transfer rates can be secured. Properly controlled, this is a most desirable condition, but where the furnace is not correctly designed, especially when the radiant heat is applied in addition to convection heat from the gases, difficulties may arise.

It is because of such conditions that only a few years ago radiant heat was regarded as something to be avoided wherever possible. Furnace builders designed their units to this end, and openly stated that "surfaces for heating oil must not be exposed to heat directly radiated from the furnace." At this time a limit of 1500 degrees Fahrenheit was commonly set and refinery engineers generally required that the temperature to which the oil was subjected should not exceed this figure. In arriving at this limit, pyrometer readings were taken at predetermined points, which, due to radiation loss, may or may not have been indicative of the actual temperatures in use. Even more recently, men of the highest standing and of recognized authority have been opposed to radiant heat and have gone to extreme limits, even at the expense of low efficiencies and high costs to avoid it. That there was reason for this attitude so general in the petroleum-refining industry is unquestioned, but it was due to the fact that in ordinary furnace construction, high gas temperatures result in incandescent settings, and the radiant heat from the extremely hot surfaces (frequently 2,200 degrees to 2,400 degrees Fahrenheit) when applied in addition to the convection heat from such high temperature gases, gives a total heat input in limited areas which is more than either the metal or the oil will stand. For example, with a temperature of 2,400 degrees Fahrenheit, assuming an oil temperature of 800 degrees Fahrenheit, the combined rate of heat transfer by radiation and convection would approximate 110,000 B.t.u. per square foot of exposed surface. This would probably cause trouble and such conditions should be avoided.

**Precautions to Prevent Radiant Heat**

To this end, various ideas in construction and operation were tried with indifferent success. Dutch ovens were added to the furnaces with the idea of completing combustion in a zone which did not directly "see" the tubes or shell structure. Bridge walls and arches were designed to prevent the direct action of radiant heat, while some refineries used entirely separate firing chambers, the heat-absorbing structure being located in a section supposedly separated from any direct radiant heat. These attempts, however, proved unsatisfactory, for when there was no means of absorbing the heat generated in the firing chambers, the temperature built up to a joint where the refractories failed, and the temperatures carried over into the other section of the furnace, resulting in burned-out tubes or shells. To avoid this condition and to keep the temperature within the required limits, excess air was purposely supplied and this air used to reduce the gas and wall temperatures. This naturally resulted in very low fuel efficiencies and high operating costs.




*Radiant-heat furnace.*

As long as the management of the refineries was satisfied with their daily capacity or throughput, and economy in fuel was not an essential factor in plant operation, it mattered little whether the heat necessary for any process was applied by convection, radiation or conduction; or a combination of any of these methods. When, however, the demand for finished products made it necessary and profitable to greatly increase throughputs, the tube still largely displaced the shell still, both for straight distillation and for cracking processes. Economy in operation also became a factor at the same time and every effort possible was made to reduce the amount of fuel consumed per barrel charged. The most obvious method of reducing fuel consumption was to reduce the amount of excess air. While this resulted in saving fuel, the increase in tube trouble and resulting loss in time on stream, more than offset the savings in fuel. This was particularly true in the operation of such tube stills and cracking coils as required high temperatures and which had a greater tendency to "coke up" the tubes. The heavier the charging stock, the more pronounced the difficulties. Observation indicated that as the refactories increased in radiance, the direct result of increased combustion temperatures, tube failure became more pronounced and therefore radiant heat was blamed.

To prevent the walls from becoming radiant, some furnace builders provided tubes, frequently covered with refractories, for the specific purpose of keeping the walls at a low temperature. However, with good combustion conditions the resulting temperatures still caused trouble and it was necessary to use large quantities of excess air. Such construction was frequently referred to as "shielded" radiant heat, although essentially this construction was a blocking or an attempt to eliminate the radiant heat. Actually the tubes so covered received little or no heat directly as radi-

(Continued on Page 137)

*Alcorn Combustion Co. Before A.I.M.E., New York meeting. Copyright, 1928, by the American Institute of Mining and Metallurgical Engineers, Inc.

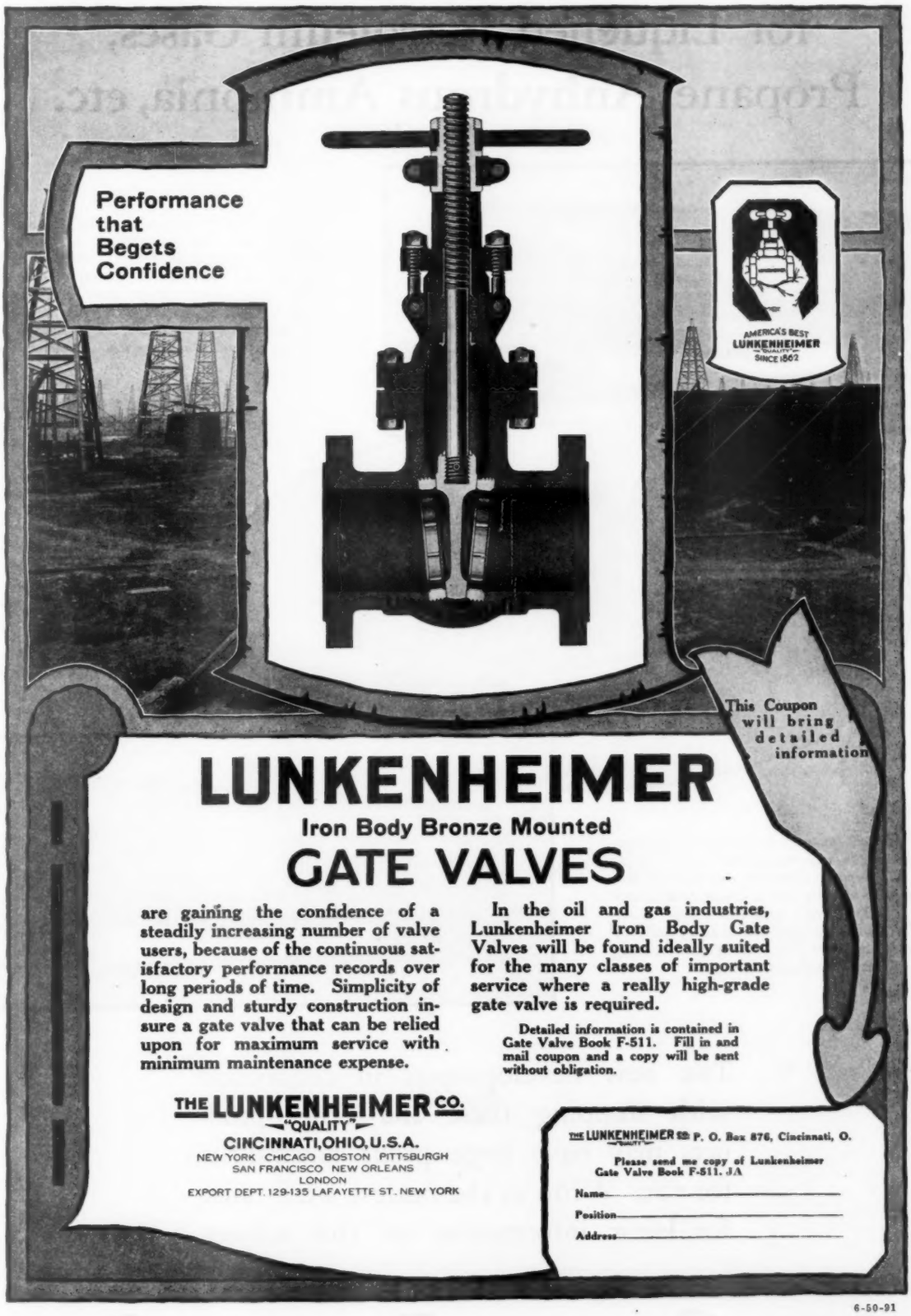
## Development of New Outlets And Sane Operation for 1928

By GEORGE D. LOCKE
*Vice President, Barnsdall Refineries, Inc.*

***The outlook for 1928 depends largely upon what the Mid-Continent refiners do in the way of manufacturing finished products. If they pursue a safe and sane policy of keeping their runs down to a point near the actual consumption in our consuming territory, then the price of petroleum products will command a figure that will return the Mid-Continent refiner a profit. But if the policy of overproduction of refined oils is continued, then Mid-Continent refiners will be compelled to operate their refineries at a loss. Barnsdall will pursue the safe and sane policy.***

***In my message last year, I dwelt upon the great consumption we are bound to have for furnace oil, and this increased demand will go on for many years to come, as I am firmly convinced that at least 25 per cent of our 25,000,000 homes in the United States, sooner or later will be using oil for heating. And with an average of 2,000 gallons of furnace oil to each home for the heating season, you have the stupendous figure of 12,500,000,000 gallons, which is equal to the consumption of gasoline during the year 1927. So, with furnace oil demand increasing, the price is bound to strengthen. In the past few years, the demand for road oil has diminished,***

*(Continued on Page 137)*




# LUNKENHEIMER

## Iron Body Bronze Mounted

# GATE VALVES

are gaining the confidence of a steadily increasing number of valve users, because of the continuous satisfactory performance records over long periods of time. Simplicity of design and sturdy construction insure a gate valve that can be relied upon for maximum service with minimum maintenance expense.

In the oil and gas industries, Lunkenheimer Iron Body Gate Valves will be found ideally suited for the many classes of important service where a really high-grade gate valve is required.

Detailed information is contained in Gate Valve Book F-511. Fill in and mail coupon and a copy will be sent without obligation.

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Name_____

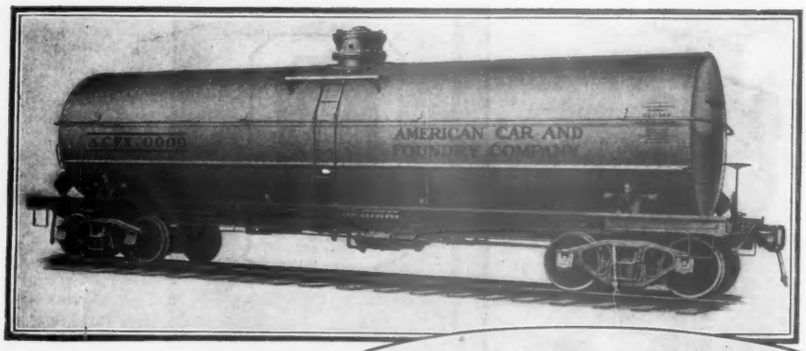
Position_____

Address_____

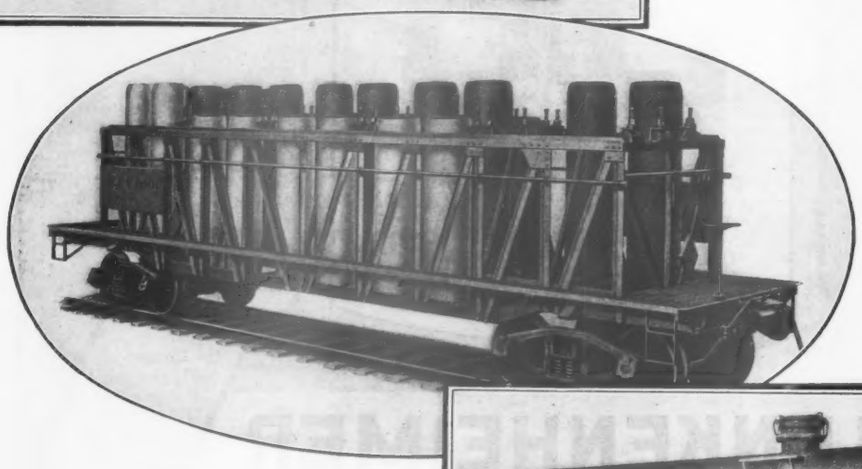
6-50-91

# a.c.f. TANK CARS

## for Liquefied Petroleum Gases, Propane, Anhydrous Ammonia, etc.




*Tank car (top picture) for liquefied petroleum, ethyl chloride, and other gases which are permissible in tanks complying with I. C. C. Shipping Container Specification No. 104-A. Equipped with special dome arrangement, incorporating a safety valve, means for loading and unloading, gauging, sampling, and ascertaining temperature, all protected by a heavy cast-steel housing and operated without opening the dome cover.*



*Multi-unit car (center picture) for carrying thirty 1,000-pound capacity Rowland Containers (I. C. C. No. 27) for propane, butane, or anhydrous ammonia, or thirty 1-ton containers for liquid chlorine or sulphur dioxide. Another type of multi-unit car can be furnished, carrying fifteen 1-ton containers, horizontally, for liquid chlorine or sulphur dioxide.*

*Tank car (bottom picture) for liquefied petroleum gases, conforming to latest requirements of the A. R. A. and I. C. C. Shipping Container Specification No. 105. This particular car has a 20-ton tank (water capacity, 11,000 gallons), tank sheets 1¼" thick, forge welded, and is equipped with a safety valve set at 200 pounds per square inch, loading and unloading pipes, angle valves, etc.*

THE new developments in connection with shipping these and other products may have large profit possibilities for you. Write to the nearest a. c. f. office for latest information on this subject.

## AMERICAN CAR AND FOUNDRY COMPANY

30 Church Street
NEW YORK

Railway Exchange Building
CHICAGO

915 Olive Street
ST. LOUIS

## PETROLEUM COKE, 1916-1927 (TONS)

| | Production | | Demand | | Stocks End of Year |
|---|---|---|---|---|---|
| | Year | Daily | Year | Daily | |
| 1927 | 1,414,321 | 3,875 | 1,359,803 | 3,725 | 345,100 |
| 1926 | 995,308 | 2,727 | 943,208 | 2,584 | 290,500 |
| 1925 | 996,000 | 2,729 | 850,400 | 2,330 | 238,400 |
| 1924 | 761,100 | 2,080 | 689,600 | 1,884 | 97,800 |
| 1923 | 672,500 | 1,842 | 681,900 | 1,868 | 26,300 |
| 1922 | 707,100 | 1,937 | 704,200 | 1,929 | 35,700 |
| 1921 | 604,500 | 1,656 | 643,300 | 1,762 | 74,500 |
| 1920 | 576,600 | 1,575 | 533,600 | 1,458 | 31,500 |
| 1919 | 603,500 | 1,653 | 613,900 | 1,682 | 21,100 |
| 1918 | 559,700 | 1,533 | 561,200 | 1,538 | 22,600 |
| 1917 | 539,400 | 1,478 | 524,400 | 1,437 | 7,600 |
| 1916 | 405,300 | 1,107 | † | | † |

†Not available.

## PETROLEUM ASPHALT, 1916-1927 (TONS)

| | Production | | Demand | | Stocks End of Year |
|---|---|---|---|---|---|
| | Year | Daily | Year | Daily | |
| 1927 | 3,418,540 | 9,366 | 3,391,071 | 9,291 | 220,800 |
| 1926 | 2,922,788 | 8,008 | 2,888,888 | 7,915 | 193,300 |
| 1925 | 2,677,400 | 7,335 | 2,615,300 | 7,165 | 159,400 |
| 1924 | 2,545,000 | 6,955 | 2,566,400 | 7,012 | 97,300 |
| 1923 | 2,327,100 | 6,376 | 2,328,600 | 6,380 | 118,100 |
| 1922 | 1,895,300 | 5,193 | 1,900,200 | 5,206 | 119,600 |
| 1921 | 1,214,500 | 3,327 | 1,197,300 | 3,280 | 98,300 |
| 1920 | 1,290,600 | 3,526 | 1,282,900 | 3,505 | 81,100 |
| 1919 | 901,900 | 2,471 | 905,400 | 2,481 | 73,400 |
| 1918 | 608,000 | 1,666 | 608,500 | 1,667 | 76,900 |
| 1917 | 739,400 | 2,026 | † | | 77,400 |
| 1916 | 716,500 | 1,958 | † | | |

## PETROLEUM COKE, BY MONTHS, 1927-1928

| | Production | | | | Total Demand | | | | Stocks End of Month |
|---|---|---|---|---|---|---|---|---|---|
| | 1927 | | 1928 | | 1927 | | 1928 | | |
| | Month | Daily | Month | Daily | Month | Daily | Month | Daily | |
| January | 92,907 | 2,997 | ------ | ---- | 90,100 | 2,906 | ------ | ---- | 287,394 |
| February | 88,102 | 3,146 | ------ | ---- | 81,102 | 2,897 | ------ | ---- | 294,682 |
| March | 98,163 | 3,167 | ------ | ---- | 67,324 | 2,172 | ------ | ---- | 325,521 |
| April | 88,404 | 2,947 | ------ | ---- | 95,396 | 3,180 | ------ | ---- | 318,529 |
| May | 87,900 | 2,840 | ------ | ---- | 77,029 | 2,485 | ------ | ---- | 329,400 |
| June | 95,300 | 3,180 | ------ | ---- | 131,600 | 4,387 | ------ | ---- | 293,100 |
| July | 90,400 | 2,920 | ------ | ---- | 77,700 | 2,506 | ------ | ---- | 305,800 |
| August | 94,800 | 3,060 | ------ | ---- | 97,000 | 3,129 | ------ | ---- | 303,600 |
| September | 97,500 | 3,250 | ------ | ---- | 87,600 | 2,920 | ------ | ---- | 313,500 |
| October | 101,600 | 3,300 | ------ | ---- | 83,800 | 2,703 | ------ | ---- | 331,300 |
| November | 102,300 | 3,400 | ------ | ---- | 84,400 | 2,813 | ------ | ---- | 349,200 |
| December | 107,800 | 3,480 | ------ | ---- | 111,900 | 3,610 | ------ | ---- | 345,100 |

## PETROLEUM ASPHALT, BY MONTHS, 1927-1928

| | Production | | | | Total Demand | | | | Stocks End of Month |
|---|---|---|---|---|---|---|---|---|---|
| | 1927 | | 1928 | | 1927 | | 1928 | | |
| | Month | Daily | Month | Daily | Month | Daily | Month | Daily | |
| January | 191,177 | 6,167 | ------ | ---- | 190,000 | 6,129 | ------ | ---- | 215,337 |
| February | 172,685 | 6,167 | ------ | ---- | 153,572 | 5,485 | ------ | ---- | 234,450 |
| March | 222,309 | 7,171 | ------ | ---- | 221,508 | 7,145 | ------ | ---- | 235,251 |
| April | 273,767 | 9,126 | ------ | ---- | 289,516 | 9,651 | ------ | ---- | 219,502 |
| May | 319,000 | 10,290 | ------ | ---- | 316,000 | 10,194 | ------ | ---- | 222,500 |
| June | 347,100 | 11,570 | ------ | ---- | 327,200 | 10,907 | ------ | ---- | 232,400 |
| July | 334,700 | 10,800 | ------ | ---- | 343,000 | 11,064 | ------ | ---- | 214,100 |
| August | 339,500 | 10,950 | ------ | ---- | 361,400 | 11,658 | ------ | ---- | 192,200 |
| September | 333,100 | 11,100 | ------ | ---- | 349,000 | 11,633 | ------ | ---- | 176,300 |
| October | 332,600 | 10,700 | ------ | ---- | 319,500 | 10,306 | ------ | ---- | 189,400 |
| November | 290,000 | 9,700 | ------ | ---- | 283,200 | 9,440 | ------ | ---- | 196,200 |
| December | 262,600 | 8,470 | ------ | ---- | 238,000 | 7,677 | ------ | ---- | 220,800 |

## PERCENTAGE RECOVERY OF MAJOR REFINED PRODUCTS FROM CRUDE OIL AT REFINERIES, 1916-1927

| | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gasoline | 19.8 | 21.5 | 26.1 | 26.1 | 26.8 | 27.7 | 29.5 | 30.9 | 33.1 | 35.1 | 38.5 | 39.9 |
| Kerosene | 14.0 | 13.0 | 13.3 | 15.4 | 12.7 | 10.4 | 11.0 | 9.6 | 9.3 | 8.1 | 7.9 | 6.8 |
| Gas oil and fuel oil | 45.0 | 49.2 | 53.5 | 50.2 | 48.6 | 51.9 | 50.9 | 49.5 | 49.8 | 49.3 | 46.9 | 47.4 |
| Lubricants | 6.0 | 5.7 | 6.1 | 5.6 | 5.7 | 4.7 | 4.7 | 4.5 | 4.3 | 4.2 | 4.1 | 3.8 |

Gasoline includes natural gasoline blended at refineries.

## PRODUCTION OF GASOLINE BY METHODS IN UNITED STATES (THOUSANDS OF BARRELS)

| | 1927 | | 1926 | | 1925 | |
|---|---|---|---|---|---|---|
| | Total | Per Cent | Total | Per Cent | Total | Per Cent |
| Total gasoline production | 330,667 | ---- | 299,734 | ---- | 259,601 | ---- |
| Straightrun gasoline | 197,282 | 59.7 | 178,302 | 59.5 | 171,382 | 66 |
| Cracked gasoline | 101,224 | 30.6 | 93,736 | 31.3 | 68,583 | 26.4 |
| Natural gasoline | 32,161 | 9.7 | 27,696 | 9.2 | 19,636 | 7.6 |

S)

| ocks End of Year |
|---|
| 220,800 |
| 193,300 |
| 159,400 |
| 97,300 |
| 118,100 |
| 119,600 |
| 98,300 |
| 81,100 |
| 73,400 |
| 76,900 |
| 77,400 |

| ocks End f Month |
|---|
| 287,394 |
| 294,682 |
| 325,521 |
| 318,529 |
| 329,400 |
| 293,100 |
| 305,800 |
| 303,600 |
| 313,500 |
| 331,300 |
| 349,200 |
| 345,100 |

| ocks End f Month |
|---|
| 215,337 |
| 234,450 |
| 235,251 |
| 219,502 |
| 222,500 |
| 232,400 |
| 214,100 |
| 192,200 |
| 176,300 |
| 189,400 |
| 196,200 |
| 220,800 |

IES,

| 1927 |
|---|
| 39.9 |
| 6.8 |
| 47.4 |
| 3.8 |

S)

| Per Cent |
|---|
| 66 |
| 26.4 |
| 7.6 |

# The Oil and Gas Jour

## CONTENTS OF SUMMARY

The accompanying table on refinery operations in United States includes yearly data from 1916-1927, inclusive, on crude oil runs to stills and output of all finished products. For 1927 the same data are given by months with provision made for 1928. The 1928 data will be available from the monthly reports of the Bureau of Mines. These reports are published in The Oil and Gas Journal when released by the government bureau about five weeks after the end of the month.

Note—Data on petroleum coke, petroleum asphalt, yields of products and production by methods will be found on reverse side.

### *TOTAL CRUDE OIL RUNS TO STILLS (THOUSANDS OF BARRELS)

| Year | Yearly Total | Daily Average | | 1927 Month | 1927 Daily | 1928 Month | 1928 Daily |
|---|---|---|---|---|---|---|---|
| 1927 | 828,514 | 2,270 | January | 69,603 | 2,245.3 | ------ | ---- |
| 1926 | 779,264 | 2,135 | February | 63,036 | 2,251.3 | ------ | ---- |
| 1925 | 739,920 | 2,027 | March | 68,741 | 2,217.4 | ------ | ---- |
| 1924 | 643,719 | 1,759 | April | 66,624 | 2,220.0 | ------ | ---- |
| 1923 | 581,238 | 1,592 | May | 69,759 | 2,250.3 | ------ | ---- |
| 1922 | 500,706 | 1,372 | June | 67,697 | 2,256.6 | ------ | ---- |
| 1921 | 443,363 | 1,215 | July | 71,625 | 2,310.6 | ------ | ---- |
| 1920 | 433,915 | 1,186 | August | 71,001 | 2,290.4 | ------ | ---- |
| 1919 | 361,520 | 990 | September | 68,586 | 2,286.2 | ------ | ---- |
| 1918 | 326,025 | 893 | October | 71,932 | 2,320.4 | ------ | ---- |
| 1917 | 315,132 | 863 | November | 69,607 | 2,319.5 | ------ | ---- |
| 1916 | 246,992 | ---- | December | 70,323 | 2,268.4 | ------ | ---- |

### DOMESTIC CRUDE OIL RUN TO STILLS (THOUSANDS OF BARRELS)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1927 | 779,813 | 2,137 | January | 65,952 | 2,127.5 | ------ | ---- |
| 1926 | 737,598 | 2,021 | February | 59,887 | 2,138.8 | ------ | ---- |
| 1925 | 698,582 | 1,914 | March | 64,954 | 2,095.3 | ------ | ---- |
| 1924 | 597,954 | 1,634 | April | 63,235 | 2,107.8 | ------ | ---- |
| 1923 | 538,232 | 1,475 | May | 66,325 | 2,139.5 | ------ | ---- |
| 1922 | 425,823 | 1,167 | June | 64,059 | 2,135.3 | ------ | ---- |
| 1921 | 368,637 | 1,010 | July | 67,790 | 2,186.9 | ------ | ---- |
| 1920 | 372,779 | 1,018 | August | 66,498 | 2,145.1 | ------ | ---- |
| 1919 | 327,533 | 897 | September | 64,197 | 2,139.9 | ------ | ---- |
| 1918 | 324,618 | 889 | October | 66,694 | 2,151.4 | ------ | ---- |
| 1917 | † | ---- | November | 64,832 | 2,161.0 | ------ | ---- |
| 1916 | † | ---- | December | 65,390 | 2,109.3 | ------ | ---- |

### FOREIGN CRUDE OIL RUN TO STILLS (THOUSANDS OF BARRELS)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1927 | 48,701 | 133 | January | 3,651 | 117.8 | ------ | ---- |
| 1926 | 44,963 | 123 | February | 3,149 | 112.5 | ------ | ---- |
| 1925 | 41,338 | 113 | March | 3,787 | 122.1 | ------ | ---- |
| 1924 | 45,765 | 125 | April | 3,389 | 113 | ------ | ---- |
| 1923 | 42,986 | 118 | May | 3,434 | 110.8 | ------ | ---- |
| 1922 | 74,883 | 205 | June | 3,638 | 121.3 | ------ | ---- |
| 1921 | 75,326 | 206 | July | 3,835 | 123.7 | ------ | ---- |
| 1920 | 61,136 | 167 | August | 4,503 | 145.3 | ------ | ---- |
| 1919 | 33,987 | 93 | September | 4,389 | 146.3 | ------ | ---- |
| 1918 | 1,407 | 4 | October | 5,238 | 169 | ------ | ---- |
| 1917 | † | ---- | November | 4,755 | 158.5 | ------ | ---- |
| 1916 | † | ---- | December | 4,933 | 159.1 | ------ | ---- |

### NATURAL GASOLINE BLENDED AT REFINERIES (THOUS. of BBLS.)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1927 | 32,161 | 88 | ‡January | 2,595 | 83.7 | ------ | ---- |
| 1926 | 27,696 | 76 | February | 2,475 | 88.4 | ------ | ---- |
| 1925 | 19,639 | 54 | March | 2,694 | 86.9 | ------ | ---- |
| 1924 | 12,671 | 35 | April | 2,603 | 86.8 | ------ | ---- |
| 1923 | 5,487 | 15 | May | 2,701 | 87.1 | ------ | ---- |
| 1922 | 3,661 | 10 | June | 2,315 | 77.2 | ------ | ---- |
| 1921 | † | ---- | July | 2,642 | 85.2 | ------ | ---- |
| 1920 | † | ---- | August | 2,527 | 81.5 | ------ | ---- |
| 1919 | † | ---- | September | 2,676 | 89.2 | ------ | ---- |
| 1918 | † | ---- | October | 2,934 | 94.6 | ------ | ---- |
| 1917 | † | ---- | November | 2,965 | 98.8 | ------ | ---- |
| 1916 | † | ---- | December | 3,034 | 97.9 | ------ | ---- |

†Not available. ‡1927 data include tank car deliveries to refineries and natural gasoline mixed with crude and run through pipe lines to refineries. *Includes domestic and foreign oil runs to stills.

### GASOLINE, 1916-1927 (THOUSA

| | *Total Supply Year | *Total Supply Daily | *Total Demand Year | *Total Demand Daily | Domestic Production Year | Domestic Production Daily | I Yea |
|---|---|---|---|---|---|---|---|
| 1927 | 335,670 | 920 | 342,370 | 938 | 330,667 | 906 | 5,0 |
| 1926 | 305,786 | 838 | 305,638 | 837 | 299,734 | 821 | 6,0 |
| 1925 | 263,414 | 722 | 255,362 | 700 | 259,601 | 711 | 3,8 |
| 1924 | 216,779 | 592 | 213,970 | 584 | 213,326 | 583 | 3,4 |
| 1923 | 184,458 | 505 | 177,487 | 486 | 179,903 | 493 | 4,5 |
| 1922 | 149,151 | 409 | 142,062 | 389 | 147,672 | 405 | 1,4 |
| 1921 | 123,604 | 339 | 120,217 | 329 | 122,704 | 336 | 9 |
| 1920 | 117,215 | 320 | 116,477 | 318 | 116,251 | 317 | 9 |
| 1919 | 94,438 | 259 | 90,643 | 329 | 94,235 | 258 | 2 |
| 1918 | 85,314 | 234 | 87,824 | 241 | 85,007 | 233 | 3 |
| 1917 | 68,120 | 187 | 66,215 | 181 | 67,870 | 186 | 2 |
| 1916 | † | | † | | 49,021 | 134 | |

### KEROSENE 1916-1927 (THOUSA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1927 | 56,169 | 154 | 57,075 | 156 | 56,114 | 154 | |
| 1926 | 61,843 | 169 | 60,389 | 165 | 61,768 | 169 | |
| 1925 | 59,708 | 164 | 61,181 | 168 | 59,689 | 164 | |
| 1924 | 60,036 | 164 | 58,530 | 160 | 60,026 | 164 | |
| 1923 | 56,004 | 153 | 55,237 | 151 | 55,927 | 153 | |
| 1922 | 54,916 | 150 | 56,169 | 154 | 54,913 | 150 | |
| 1921 | 46,313 | 127 | 47,376 | 130 | 46,313 | 127 | |
| 1920 | 55,240 | 151 | 53,812 | 147 | 55,240 | 151 | |
| 1919 | 55,753 | 153 | 56,501 | 155 | 55,573 | 152 | |
| 1918 | 43,461 | 119 | 46,135 | 126 | 43,461 | 119 | |
| 1917 | 41,114 | 112 | 40,473 | 111 | 41,114 | 113 | |
| 1916 | † | | ----- | ---- | 34,655 | 95 | |

### LUBRICATING OIL, 1916-1927 (THO

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1927 | 31,728 | 87 | 31,444 | 86 | 31,721 | 87 | |
| 1926 | 32,326 | 89 | 32,003 | 88 | 32,293 | 88 | |
| 1925 | 31,092 | 85 | 30,259 | 83 | 31,055 | 85 | |
| 1924 | 27,509 | 75 | 27,155 | 74 | 27,498 | 75 | |
| 1923 | 26,157 | 72 | 25,556 | 70 | 26,128 | 72 | |
| 1922 | 23,347 | 64 | 23,418 | 64 | 23,304 | 64 | |
| 1921 | 20,896 | 57 | 18,935 | 52 | 20,896 | 57 | ---- |
| 1920 | 24,938 | 68 | 24,316 | 66 | 24,938 | 68 | ---- |
| 1919 | 20,161 | 55 | 20,143 | 55 | 20,161 | 55 | ---- |
| 1918 | 20,035 | 55 | 19,949 | 55 | 20,035 | 55 | ---- |
| 1917 | 17,947 | 49 | † | | 17,947 | 49 | ---- |
| 1916 | 14,870 | 41 | † | | 14,870 | 41 | ---- |

### FUEL OILS AND GAS OILS, 1916-1927 (

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1927 | 400,465 | 1,097 | ------ | ---- | 392,342 | 1,075 | 8,1 |
| 1926 | 379,293 | 1,039 | ------ | ---- | 365,195 | 1,001 | 14,4 |
| 1925 | 377,236 | 1,034 | ------ | ---- | 364,991 | 1,000 | 12,2 |
| 1924 | 333,403 | 911 | ------ | ---- | 320,476 | 876 | 12,9 |
| 1923 | 299,767 | 821 | ------ | ---- | 287,481 | 788 | 12,2 |
| 1922 | 279,729 | 766 | ------ | ---- | 254,910 | 698 | ---- |
| 1921 | 249,295 | 683 | ------ | ---- | 230,091 | 630 | ---- |
| 1920 | 240,372 | 657 | ------ | ---- | 210,987 | 576 | ---- |
| 1919 | 198,885 | 545 | ------ | ---- | 181,602 | 498 | ---- |
| 1918 | 193,559 | 530 | ------ | ---- | 174,319 | 478 | ---- |
| 1917 | 199,113 | 546 | ------ | ---- | 155,079 | 425 | ---- |
| 1916 | ---- | ---- | ------ | ---- | 111,045 | 303 | ---- |

### PETROLEUM WAX, 1916-1927 (TH

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1927 | 604,809 | 1,657 | 622,926 | 1,707 | 584,347 | 1,601 | 20,4 |
| 1926 | 655,798 | 1,796 | 586,858 | 1,607 | 645,815 | 1,769 | 9,9 |
| 1925 | 605,165 | 1,658 | 578,480 | 1,585 | 590,577 | 1,618 | 14,5 |
| 1924 | 529,444 | 1,446 | 604,410 | 1,651 | 516,577 | 1,411 | 12,8 |
| 1923 | 479,490 | 1,314 | 519,623 | 1,424 | 466,647 | 1,278 | 12,8 |
| 1922 | 469,450 | 1,286 | 472,122 | 1,293 | 462,003 | 1,266 | 7,4 |
| 1921 | 439,430 | 1,204 | 427,235 | 1,171 | 434,884 | 1,191 | 4,5 |
| 1920 | 548,833 | 1,500 | 575,927 | 1,574 | 541,204 | 1,479 | 7,6 |
| 1919 | 477,118 | 1,307 | 454,314 | 1,245 | 467,235 | 1,280 | 9,8 |
| 1918 | 510,791 | 1,399 | 446,193 | 1,222 | 505,144 | 1,384 | 5,6 |
| 1917 | 490,909 | 1,345 | † | | 481,200 | 1,318 | 9,7 |
| 1916 | 395,439 | 1,080 | † | | 386,181 | 1,055 | 9,2 |

†Not available. *Total supply equals domestic production plus imports. ‡East of California only.

# ournal's Summary of Refinery Operation

**BASED ON REPORTS OF BUREAU OF MINES, DEPARTMENT OF COMMERCE**

**(THOUSANDS OF BARRELS)**

| ction ily | Imports Year | Imports Daily | Domestic Demand Year | Domestic Demand Daily | Exports Year | Exports Daily | Stocks End of Year |
|---|---|---|---|---|---|---|---|
| 906 | 5,003 | 14 | 297,928 | 816 | 44,442 | 122 | 32,323 |
| 821 | 6,052 | 17 | 262,165 | 718 | 43,473 | 119 | 39,023 |
| 711 | 3,813 | 10 | 223,865 | 613 | 31,497 | 86 | 38,875 |
| 583 | 3,453 | 9 | 185,063 | 506 | 28,246 | 77 | 30,823 |
| 493 | 4,555 | 12 | 156,746 | 429 | 20,136 | 55 | 28,014 |
| 405 | 1,479 | 4 | 127,906 | 350 | 13,787 | 38 | 21,043 |
| 336 | 900 | 2 | 107,525 | 295 | 12,692 | 35 | 13,954 |
| 317 | 964 | 3 | 101,208 | 276 | 16,269 | 42 | 11,009 |
| 258 | 203 | 1 | 81,783 | 224 | 8,860 | 24 | 10,638 |
| 233 | 307 | 1 | 74,506 | 204 | 13,318 | 36 | 7,080 |
| 186 | 250 | 1 | 56,313 | 154 | 9,902 | 27 | 9,816 |
| 134 | 64 | ---- | † | | 8,473 | 23 | 8,229 |

**(THOUSANDS OF BARRELS)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 154 | 55 | ---- | 37,595 | 103 | 19,480 | 53 | 7,669 |
| 169 | 75 | ---- | 38,329 | 105 | 22,060 | 60 | 8,575 |
| 164 | 19 | ---- | 39,969 | 110 | 21,212 | 58 | 7,121 |
| 164 | 10 | ---- | 36,712 | 100 | 21,818 | 60 | 8,594 |
| 153 | 7 | ---- | 35,048 | 96 | 20,189 | 55 | 7,231 |
| 150 | 3 | ---- | 34,854 | 95 | 21,315 | 58 | 6,692 |
| 127 | † | ---- | 29,537 | 81 | 17,833 | 49 | 8,119 |
| 151 | † | ---- | 33,082 | 90 | 20,730 | 57 | 9,359 |
| 152 | † | ---- | 33,188 | 91 | 23,313 | 64 | 8,079 |
| 119 | † | ---- | 34,442 | 94 | 11,693 | 32 | 9,050 |
| 113 | † | ---- | 24,803 | 68 | 15,670 | 43 | 11,851 |
| 95 | † | ---- | † | | 20,350 | 56 | 11,355 |

**1927 (THOUSANDS OF BARRELS)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 87 | 7 | ---- | 21,634 | 59 | 9,810 | 27 | 7,860 |
| 88 | 33 | ---- | 22,565 | 62 | 9,438 | 26 | 7,576 |
| 85 | 37 | ---- | 20,581 | 57 | 9,596 | 26 | 7,253 |
| 75 | 11 | ---- | 18,124 | 50 | 9,031 | 25 | 6,420 |
| 72 | 29 | ---- | 17,260 | 47 | 8,296 | 23 | 6,138 |
| 64 | 43 | ---- | 15,528 | 43 | 7,890 | 22 | 5,613 |
| 57 | ------ | ---- | 12,047 | 33 | 6,888 | 19 | 5,735 |
| 68 | ------ | ---- | 14,742 | 40 | 9,574 | 26 | 3,822 |
| 55 | ------ | ---- | 13,600 | 37 | 6,543 | 18 | 3,269 |
| 55 | ------ | ---- | 13,822 | 38 | 6,127 | 17 | 3,306 |
| 49 | ------ | ---- | † | | 6,677 | 18 | 3,258 |
| 41 | ------ | ---- | † | | 6,210 | 17 | ------ |

**1916-1927 (THOUSANDS OF BARRELS)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 075 | 8,123 | 22 | † | | 47,339 | 130 | ‡31,982 |
| 001 | 14,430 | 40 | ------ | ---- | 38,351 | 105 | 24,898 |
| 000 | 12,245 | 34 | ------ | ---- | 32,509 | 89 | 24,681 |
| 876 | 12,927 | 35 | ------ | ---- | 34,292 | 94 | 39,774 |
| 788 | 12,286 | 34 | ------ | ---- | 29,252 | 80 | 36,072 |
| 598 | ------ | ---- | ------ | ---- | 16,600 | 45 | 31,065 |
| 530 | ------ | ---- | ------ | ---- | 20,120 | 55 | 31,697 |
| 576 | ------ | ---- | ------ | ---- | 19,705 | 54 | 19,938 |
| 498 | ------ | ---- | ------ | ---- | 13,925 | 38 | 17,003 |
| 478 | ------ | ---- | ------ | ---- | 28,589 | 78 | 15,691 |
| 425 | ------ | ---- | ------ | ---- | 26,749 | 73 | 13,759 |
| 303 | ------ | ---- | ------ | ---- | 22,800 | 62 | 17,156 |

**-1927 (THOUSANDS OF POUNDS)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 601 | 20,462 | 56 | 283,590 | 777 | 339,336 | 930 | 167,214 |
| 769 | 9,983 | 27 | 251,274 | 688 | 335,584 | 919 | 185,331 |
| 618 | 14,588 | 40 | 244,301 | 669 | 334,179 | 916 | 116,391 |
| 411 | 12,867 | 35 | 221,590 | 605 | 382,820 | 1,046 | 89,706 |
| 278 | 12,843 | 35 | 189,830 | 520 | 329,793 | 904 | 164,758 |
| 266 | 7,447 | 20 | 187,621 | 514 | 284,501 | 779 | 204,891 |
| 191 | 4,546 | 12 | 201,354 | 552 | 225,881 | 619 | 207,563 |
| 479 | 7,629 | 21 | 200,651 | 548 | 375,276 | 1,025 | 195,368 |
| 280 | 9,883 | 27 | 190,969 | 523 | 263,345 | 721 | 222,462 |
| 384 | 5,647 | 15 | 210,650 | 577 | 235,543 | 645 | 199,658 |
| 318 | 9,709 | 27 | † | | 311,090 | 852 | 135,000 |
| 055 | 9,258 | 25 | † | | 376,813 | 1,030 | † |

on plus imports. *Total demand equals domestic demand plus ex-

**GASO**

| | *Total Supply 1927 Month | *Total Supply 1927 Daily | *Total Supply 1928 Month | *Total Supply 1928 Daily | *Total Demand 1927 Month | *Total Demand 1927 Daily | *Total Demand 1928 Month | *Total Demand 1928 Daily |
|---|---|---|---|---|---|---|---|---|
| January | 28,480 | 919 | ------ | ---- | 21,445 | 692 | ------ | ---- |
| February | 25,440 | 909 | ------ | ---- | 21,784 | 778 | ------ | ---- |
| March | 28,379 | 916 | ------ | ---- | 25,683 | 829 | ------ | ---- |
| April | 26,954 | 899 | ------ | ---- | 26,985 | 899 | ------ | ---- |
| May | 27,277 | 880 | ------ | ---- | 31,047 | 1,001 | ------ | ---- |
| June | 27,206 | 907 | ------ | ---- | 32,047 | 1,069 | ------ | ---- |
| July | 28,308 | 913 | ------ | ---- | 33,007 | 1,065 | ------ | ---- |
| August | 28,358 | 915 | ------ | ---- | 33,972 | 1,069 | ------ | ---- |
| September | 28,231 | 941 | ------ | ---- | 31,948 | 1,065 | ------ | ---- |
| October | 29,268 | 944 | ------ | ---- | 29,456 | 950 | ------ | ---- |
| November | 28,975 | 966 | ------ | ---- | 28,124 | 937 | ------ | ---- |
| December | 28,797 | 929 | ------ | ---- | 26,872 | 867 | ------ | ---- |

**KER**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| January | 5,113 | 165 | ------ | ---- | 5,498 | 177 | ------ | ---- |
| February | 4,454 | 159 | ------ | ---- | 3,989 | 143 | ------ | ---- |
| March | 4,802 | 155 | ------ | ---- | 4,707 | 152 | ------ | ---- |
| April | 4,608 | 154 | ------ | ---- | 4,637 | 155 | ------ | ---- |
| May | 4,664 | 150 | ------ | ---- | 4,821 | 156 | ------ | ---- |
| June | 4,310 | 144 | ------ | ---- | 4,311 | 144 | ------ | ---- |
| July | 4,484 | 145 | ------ | ---- | 4,013 | 129 | ------ | ---- |
| August | 4,424 | 143 | ------ | ---- | 5,089 | 164 | ------ | ---- |
| September | 4,686 | 156 | ------ | ---- | 4,939 | 164 | ------ | ---- |
| October | 4,885 | 158 | ------ | ---- | 5,680 | 183 | ------ | ---- |
| November | 4,851 | 161 | ------ | ---- | 4,335 | 145 | ------ | ---- |
| December | 4,884 | 157 | ------ | ---- | 4,056 | 163 | ------ | ---- |

**LUBRICA**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| January | 2,570 | 83 | ------ | ---- | 2,360 | 76 | ------ | ---- |
| February | 2,345 | 84 | ------ | ---- | 1,851 | 66 | ------ | ---- |
| March | 2,903 | 154 | ------ | ---- | 3,229 | 104 | ------ | ---- |
| April | 2,616 | 87 | ------ | ---- | 2,475 | 82 | ------ | ---- |
| May | 2,626 | 85 | ------ | ---- | 2,791 | 90 | ------ | ---- |
| June | 2,572 | 86 | ------ | ---- | 2,955 | 98 | ------ | ---- |
| July | 2,672 | 86 | ------ | ---- | 2,804 | 90 | ------ | ---- |
| August | 2,753 | 89 | ------ | ---- | 2,758 | 89 | ------ | ---- |
| September | 2,782 | 93 | ------ | ---- | 2,826 | 95 | ------ | ---- |
| October | 2,758 | 90 | ------ | ---- | 2,621 | 84 | ------ | ---- |
| November | 2,477 | 83 | ------ | ---- | 2,537 | 85 | ------ | ---- |
| December | 2,801 | 90 | ------ | ---- | 2,465 | 80 | ------ | ---- |

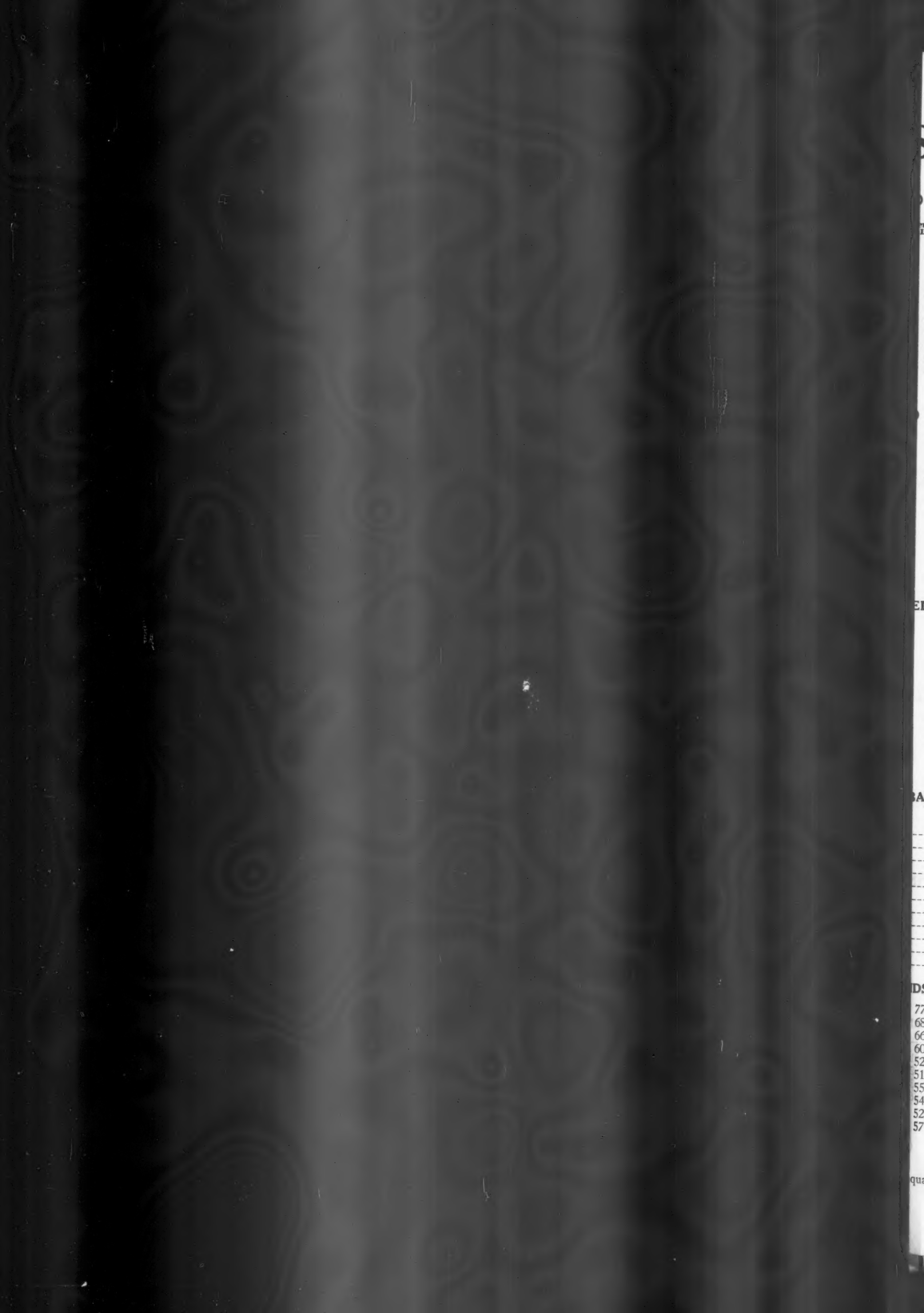
**FUEL OILS**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| January | 33,596 | 1,083 | ------ | ---- | † | | ------ | ---- |
| February | 31,238 | 1,116 | ------ | ---- | ------ | ---- | ------ | ---- |
| March | 32,902 | 1,061 | ------ | ---- | ------ | ---- | ------ | ---- |
| April | 32,661 | 1,089 | ------ | ---- | ------ | ---- | ------ | ---- |
| May | 34,325 | 1,108 | ------ | ---- | ------ | ---- | ------ | ---- |
| June | 32,542 | 1,084 | ------ | ---- | ------ | ---- | ------ | ---- |
| July | 34,542 | 1,108 | ------ | ---- | ------ | ---- | ------ | ---- |
| August | 34,489 | 1,113 | ------ | ---- | ------ | ---- | ------ | ---- |
| September | 32,680 | 1,089 | ------ | ---- | ------ | ---- | ------ | ---- |
| October | 34,712 | 1,120 | ------ | ---- | ------ | ---- | ------ | ---- |
| November | 33,298 | 1,109 | ------ | ---- | ------ | ---- | ------ | ---- |
| December | 33,480 | 1,080 | ------ | ---- | ------ | ---- | ------ | ---- |

**PETROL**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| January | 54,574 | 1,761 | ------ | ---- | 46,680 | 1,519 | ------ | ---- |
| February | 49,411 | 1,765 | ------ | ---- | 43,794 | 1,564 | ------ | ---- |
| March | 54,554 | 1,760 | ------ | ---- | 51,666 | 1,667 | ------ | ---- |
| April | 50,422 | 1,681 | ------ | ---- | 40,743 | 1,358 | ------ | ---- |
| May | 46,996 | 1,516 | ------ | ---- | 50,686 | 1,635 | ------ | ---- |
| June | 45,338 | 1,511 | ------ | ---- | 53,859 | 1,796 | ------ | ---- |
| July | 50,768 | 1,638 | ------ | ---- | 58,075 | 1,874 | ------ | ---- |
| August | 44,232 | 1,430 | ------ | ---- | 55,088 | 1,777 | ------ | ---- |
| September | 50,928 | 1,697 | ------ | ---- | 61,401 | 1,046 | ------ | ---- |
| October | 50,363 | 1,625 | ------ | ---- | 50,168 | 1,618 | ------ | ---- |
| November | 51,288 | 1,709 | ------ | ---- | 49,945 | 1,635 | ------ | ---- |
| December | 55,945 | 1,804 | ------ | ---- | 60,431 | 1,949 | ------ | ---- |

*Total supply equals domestic production plus imports. *Total demand equals d



# Summary of Refinery Operations in

**BASED ON REPORTS OF BUREAU OF MINES, DEPARTMENT OF COMMERCE**

## GASOLINE, BY M

| rmand Daily | Exports Year | Exports Daily | Stocks End of Year | | *Total Supply 1927 Month | *Total Supply 1927 Daily | *Total Supply 1928 Month | *Total Supply 1928 Daily | *Total Demand 1927 Month | *Total Demand 1927 Daily | *Total Demand 1928 Month | *Total Demand 1928 Daily | Do 1927 Month | Do 1927 D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 816 | 44,442 | 122 | 32,323 | January | 28,480 | 919 | ------ | ---- | 21,445 | 692 | ------ | ---- | 27,960 | |
| 718 | 43,473 | 119 | 39,023 | February | 25,440 | 909 | ------ | ---- | 21,784 | 778 | ------ | ---- | 25,024 | |
| 613 | 31,497 | 86 | 38,875 | March | 28,379 | 916 | ------ | ---- | 25,683 | 829 | ------ | ---- | 27,886 | |
| 506 | 28,246 | 77 | 30,823 | April | 26,954 | 899 | ------ | ---- | 26,985 | 899 | ------ | ---- | 26,577 | |
| 429 | 20,136 | 55 | 28,014 | May | 27,277 | 880 | ------ | ---- | 31,047 | 1,001 | ------ | ---- | 26,787 | |
| 350 | 13,787 | 38 | 21,043 | June | 27,206 | 907 | ------ | ---- | 32,047 | 1,069 | ------ | ---- | 26,616 | |
| 295 | 12,692 | 35 | 13,954 | July | 28,308 | 913 | ------ | ---- | 33,007 | 1,065 | ------ | ---- | 25,118 | |
| 276 | 16,269 | 42 | 11,009 | August | 28,358 | 915 | ------ | ---- | 33,972 | 1,069 | ------ | ---- | 28,010 | |
| 224 | 8,860 | 24 | 10,638 | September | 28,231 | 941 | ------ | ---- | 31,948 | 1,065 | ------ | ---- | 27,716 | |
| 204 | 13,318 | 36 | 7,080 | October | 29,268 | 944 | ------ | ---- | 29,456 | 950 | ------ | ---- | 28,903 | |
| 154 | 9,902 | 27 | 9,816 | November | 28,975 | 966 | ------ | ---- | 28,124 | 937 | ------ | ---- | 28,558 | |
| | 8,473 | 23 | 8,229 | December | 28,797 | 929 | ------ | ---- | 26,872 | 867 | ------ | ---- | 28,512 | |

## KEROSENE, BY M

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 103 | 19,480 | 53 | 7,669 | January | 5,113 | 165 | ------ | ---- | 5,498 | 177 | ------ | ---- | 5,113 | |
| 105 | 22,060 | 60 | 8,575 | February | 4,454 | 159 | ------ | ---- | 3,989 | 143 | ------ | ---- | 4,453 | |
| 110 | 21,212 | 58 | 7,121 | March | 4,802 | 155 | ------ | ---- | 4,707 | 152 | ------ | ---- | 4,802 | |
| 100 | 21,818 | 60 | 8,594 | April | 4,608 | 154 | ------ | ---- | 4,637 | 155 | ------ | ---- | 4,608 | |
| 96 | 20,189 | 55 | 7,231 | May | 4,664 | 150 | ------ | ---- | 4,821 | 156 | ------ | ---- | 4,663 | |
| 95 | 21,315 | 58 | 6,692 | June | 4,310 | 144 | ------ | ---- | 4,311 | 144 | ------ | ---- | 4,308 | |
| 81 | 17,833 | 49 | 8,119 | July | 4,484 | 145 | ------ | ---- | 4,013 | 129 | ------ | ---- | 4,484 | |
| 90 | 20,730 | 57 | 9,359 | August | 4,424 | 143 | ------ | ---- | 5,089 | 164 | ------ | ---- | 4,420 | |
| 91 | 23,313 | 64 | 8,079 | September | 4,686 | 156 | ------ | ---- | 4,939 | 164 | ------ | ---- | 4,686 | |
| 94 | 11,693 | 32 | 9,050 | October | 4,885 | 158 | ------ | ---- | 5,680 | 183 | ------ | ---- | 4,884 | |
| 68 | 15,670 | 43 | 11,851 | November | 4,851 | 161 | ------ | ---- | 4,335 | 145 | ------ | ---- | 4,824 | |
| | 20,350 | 56 | 11,355 | December | 4,884 | 157 | ------ | ---- | 4,056 | 163 | ------ | ---- | 4,869 | |

## LUBRICATING OILS,

| ELS) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 59 | 9,810 | 27 | 7,860 | January | 2,570 | 83 | ------ | ---- | 2,360 | 76 | ------ | ---- | 2,570 | |
| 62 | 9,438 | 26 | 7,576 | February | 2,345 | 84 | ------ | ---- | 1,851 | 66 | ------ | ---- | 2,345 | |
| 57 | 9,596 | 26 | 7,253 | March | 2,903 | 154 | ------ | ---- | 3,229 | 104 | ------ | ---- | 2,754 | |
| 50 | 9,031 | 25 | 6,420 | April | 2,616 | 87 | ------ | ---- | 2,475 | 82 | ------ | ---- | 2,615 | |
| 47 | 8,296 | 23 | 6,138 | May | 2,626 | 85 | ------ | ---- | 2,791 | 90 | ------ | ---- | 2,625 | |
| 43 | 7,890 | 22 | 5,613 | June | 2,572 | 86 | ------ | ---- | 2,955 | 98 | ------ | ---- | 2,571 | |
| 33 | 6,888 | 19 | 5,735 | July | 2,672 | 86 | ------ | ---- | 2,804 | 90 | ------ | ---- | 2,672 | |
| 40 | 9,574 | 26 | 3,822 | August | 2,753 | 89 | ------ | ---- | 2,758 | 89 | ------ | ---- | 2,752 | |
| 37 | 6,543 | 18 | 3,269 | September | 2,782 | 93 | ------ | ---- | 2,826 | 95 | ------ | ---- | 2,782 | |
| 38 | 6,127 | 17 | 3,306 | October | 2,758 | 90 | ------ | ---- | 2,621 | 84 | ------ | ---- | 2,757 | |
| | 6,677 | 18 | 3,258 | November | 2,477 | 83 | ------ | ---- | 2,537 | 85 | ------ | ---- | 2,477 | |
| | 6,210 | 17 | ------ | December | 2,801 | 90 | ------ | ---- | 2,465 | 80 | ------ | ---- | 2,801 | |

## FUEL OILS AND GAS OI

| ARRELS) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 47,339 | 130 | ‡31,982 | January | 33,596 | 1,083 | ------ | ---- | † | - | ------ | ---- | 32,936 | 1,0 |
| ---- | 38,351 | 105 | 24,898 | February | 31,238 | 1,116 | ------ | ---- | ------ | ---- | ------ | ---- | 30,185 | 1,0 |
| ---- | 32,509 | 89 | 24,681 | March | 32,902 | 1,061 | ------ | ---- | ------ | ---- | ------ | ---- | 32,377 | 1,0 |
| ---- | 34,292 | 94 | 39,774 | April | 32,661 | 1,089 | ------ | ---- | ------ | ---- | ------ | ---- | 31,856 | 1,0 |
| ---- | 29,252 | 80 | 36,072 | May | 34,325 | 1,108 | ------ | ---- | ------ | ---- | ------ | ---- | 33,499 | 1,0 |
| ---- | 16,600 | 45 | 31,065 | June | 32,542 | 1,084 | ------ | ---- | ------ | ---- | ------ | ---- | 31,691 | 1,0 |
| ---- | 20,120 | 55 | 31,697 | July | 34,542 | 1,108 | ------ | ---- | ------ | ---- | ------ | ---- | 33,693 | 1,0 |
| ---- | 19,705 | 54 | 19,938 | August | 34,489 | 1,113 | ------ | ---- | ------ | ---- | ------ | ---- | 34,098 | 1,1 |
| ---- | 13,925 | 38 | 17,003 | September | 32,680 | 1,089 | ------ | ---- | ------ | ---- | ------ | ---- | 32,339 | 1,0 |
| ---- | 28,589 | 78 | 15,691 | October | 34,712 | 1,120 | ------ | ---- | ------ | ---- | ------ | ---- | 34,045 | 1,0 |
| ---- | 26,749 | 73 | 13,759 | November | 33,298 | 1,109 | ------ | ---- | ------ | ---- | ------ | ---- | 32,594 | 1,0 |
| ---- | 22,800 | 62 | 17,156 | December | 33,480 | 1,080 | ------ | ---- | ------ | ---- | ------ | ---- | 33,029 | 1,0 |

## PETROLEUM WAX, B

| DS) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 777 | 339,336 | 930 | 167,214 | January | 54,574 | 1,761 | ------ | ---- | 46,680 | 1,519 | ------ | ---- | 54,114 | 1,7 |
| 688 | 335,584 | 919 | 185,331 | February | 49,411 | 1,765 | ------ | ---- | 43,794 | 1,564 | ------ | ---- | 47,363 | 1,6 |
| 669 | 334,179 | 916 | 116,391 | March | 54,554 | 1,760 | ------ | ---- | 51,666 | 1,667 | ------ | ---- | 53,644 | 1,7 |
| 605 | 382,820 | 1,046 | 89,706 | April | 50,422 | 1,681 | ------ | ---- | 40,743 | 1,358 | ------ | ---- | 48,917 | 1,6 |
| 520 | 329,793 | 904 | 164,758 | May | 46,996 | 1,516 | ------ | ---- | 50,686 | 1,635 | ------ | ---- | 46,267 | 1,4 |
| 514 | 284,501 | 779 | 204,891 | June | 45,338 | 1,511 | ------ | ---- | 53,859 | 1,796 | ------ | ---- | 44,938 | 1,4 |
| 552 | 225,881 | 619 | 207,563 | July | 50,768 | 1,638 | ------ | ---- | 58,075 | 1,874 | ------ | ---- | 47,979 | 1,5 |
| 548 | 375,276 | 1,025 | 195,368 | August | 44,232 | 1,430 | ------ | ---- | 55,088 | 1,777 | ------ | ---- | 41,576 | 1,3 |
| 523 | 263,345 | 721 | 222,462 | September | 50,928 | 1,697 | ------ | ---- | 61,401 | 1,046 | ------ | ---- | 47,888 | 1,5 |
| 577 | 235,543 | 645 | 199,658 | October | 50,363 | 1,625 | ------ | ---- | 50,168 | 1,618 | ------ | ---- | 49,476 | 1,5 |
| | 311,090 | 852 | 135,000 | November | 51,288 | 1,709 | ------ | ---- | 49,945 | 1,635 | ------ | ---- | 48,146 | 1,6 |
| | 376,813 | 1,030 | † | December | 55,945 | 1,804 | ------ | ---- | 60,431 | 1,949 | ------ | ---- | 54,039 | 1,7 |

quals domestic demand plus ex-

*Total supply equals domestic production plus imports. *Total demand equals domestic demand

# s in the United States

## LINE, BY MONTHS, 1927-1928 (THOUSANDS OF BARRELS)

| Domestic Production 1927 Month | Domestic Production 1927 Daily | Domestic Production 1928 Month | Domestic Production 1928 Daily | Imports 1927 Month | Imports 1927 Daily | Imports 1928 Month | Imports 1928 Daily | Domestic Demand 1927 Month | Domestic Demand 1927 Daily | Domestic Demand 1928 Month | Domestic Demand 1928 Daily | Exports 1927 Month | Exports 1927 Daily | Exports 1928 Month | Exports 1928 Daily | Stocks End of Month |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27,960 | 902 | ------- | ---- | 520 | 17 | ------- | ---- | 17,888 | 577 | ------- | ---- | 3,557 | 115 | ------- | ---- | 46,058 |
| 25,024 | 894 | ------- | ---- | 416 | 15 | ------- | ---- | 18,240 | 651 | ------- | ---- | 3,544 | 127 | ------- | ---- | 49,714 |
| 27,886 | 900 | ------- | ---- | 493 | 16 | ------- | ---- | 22,464 | 725 | ------- | ---- | 3,219 | 104 | ------- | ---- | 52,410 |
| 26,577 | 886 | ------- | ---- | 377 | 13 | ------- | ---- | 23,371 | 779 | ------- | ---- | 3,614 | 120 | ------- | ---- | 52,379 |
| 26,787 | 864 | ------- | ---- | 490 | 16 | ------- | ---- | 26,579 | 857 | ------- | ---- | 4,468 | 144 | ------- | ---- | 48,609 |
| 26,616 | 887 | ------- | ---- | 590 | 20 | ------- | ---- | 27,799 | 927 | ------- | ---- | 4,248 | 142 | ------- | ---- | 43,768 |
| 28,118 | 907 | ------- | ---- | 190 | 6 | ------- | ---- | 29,784 | 961 | ------- | ---- | 3,223 | 104 | ------- | ---- | 39,069 |
| 28,010 | 904 | ------- | ---- | 348 | 11 | ------- | ---- | 29,779 | 961 | ------- | ---- | 4,193 | 135 | ------- | ---- | 33,455 |
| 27,716 | 924 | ------- | ---- | 515 | 17 | ------- | ---- | 28,419 | 947 | ------- | ---- | 3,539 | 118 | ------- | ---- | 29,738 |
| 28,903 | 932 | ------- | ---- | 365 | 12 | ------- | ---- | 25,497 | 822 | ------- | ---- | 3,959 | 128 | ------- | ---- | 29,550 |
| 28,558 | 952 | ------- | ---- | 417 | 14 | ------- | ---- | 24,400 | 813 | ------- | ---- | 3,724 | 124 | ------- | ---- | 30,401 |
| 28,512 | 920 | ------- | ---- | 282 | 9 | ------- | ---- | 23,718 | 765 | ------- | ---- | 3,154 | 102 | ------- | ---- | 32,323 |

## OSENE, BY MONTHS, 1927-1928 (THOUSANDS OF BARRELS)

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5,113 | 165 | ------- | ---- | ------- | ---- | ------- | ---- | 3,882 | 125 | ------- | ---- | 1,616 | 52 | ------- | ---- | 8,190 |
| 4,453 | 159 | ------- | ---- | 1 | ---- | ------- | ---- | 2,590 | 93 | ------- | ---- | 1,399 | 50 | ------- | ---- | 8,655 |
| 4,802 | 155 | ------- | ---- | ------- | ---- | ------- | ---- | 3,356 | 108 | ------- | ---- | 1,351 | 44 | ------- | ---- | 8,753 |
| 4,608 | 154 | ------- | ---- | ------- | ---- | ------- | ---- | 2,776 | 93 | ------- | ---- | 1,861 | 62 | ------- | ---- | 8,725 |
| 4,663 | 150 | ------- | ---- | 1 | ---- | ------- | ---- | 3,188 | 103 | ------- | ---- | 1,633 | 53 | ------- | ---- | 8,568 |
| 4,308 | 144 | ------- | ---- | 2 | ---- | ------- | ---- | 2,695 | 90 | ------- | ---- | 1,616 | 54 | ------- | ---- | 8,567 |
| 4,484 | 145 | ------- | ---- | ------- | ---- | ------- | ---- | 2,637 | 85 | ------- | ---- | 1,376 | 44 | ------- | ---- | 9,038 |
| 4,420 | 143 | ------- | ---- | 4 | ---- | ------- | ---- | 3,389 | 109 | ------- | ---- | 1,700 | 55 | ------- | ---- | 8,373 |
| 4,686 | 156 | ------- | ---- | ------- | ---- | ------- | ---- | 3,280 | 109 | ------- | ---- | 1,659 | 55 | ------- | ---- | 8,120 |
| 4,884 | 158 | ------- | ---- | 1 | ---- | ------- | ---- | 3,469 | 112 | ------- | ---- | 2,211 | 71 | ------- | ---- | 7,325 |
| 4,824 | 161 | ------- | ---- | 27 | 1 | ------- | ---- | 2,514 | 84 | ------- | ---- | 1,821 | 61 | ------- | ---- | 7,841 |
| 4,869 | 157 | ------- | ---- | 15 | ---- | ------- | ---- | 3,819 | 123 | ------- | ---- | 1,237 | 40 | ------- | ---- | 7,669 |

## ATING OILS, BY MONTHS, 1927-1928 (THOUSANDS OF BARRELS)

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,570 | 83 | ------- | ---- | ------- | ---- | ------- | ---- | 1,496 | 48 | ------- | ---- | 864 | 28 | ------- | ---- | 7,867 |
| 2,345 | 84 | ------- | ---- | ------- | ---- | ------- | ---- | 1,231 | 44 | ------- | ---- | 620 | 22 | ------- | ---- | 8,361 |
| 2,754 | 89 | ------- | ---- | 149 | 5 | ------- | ---- | 2,334 | 75 | ------- | ---- | 895 | 29 | ------- | ---- | 8,035 |
| 2,615 | 87 | ------- | ---- | 1 | ---- | ------- | ---- | 1,712 | 57 | ------- | ---- | 763 | 25 | ------- | ---- | 8,176 |
| 2,625 | 85 | ------- | ---- | 1 | ---- | ------- | ---- | 1,928 | 62 | ------- | ---- | 863 | 28 | ------- | ---- | 8,011 |
| 2,571 | 86 | ------- | ---- | 1 | ---- | ------- | ---- | 2,197 | 73 | ------- | ---- | 758 | 25 | ------- | ---- | 7,628 |
| 2,672 | 86 | ------- | ---- | ------- | ---- | ------- | ---- | 1,811 | 58 | ------- | ---- | 993 | 32 | ------- | ---- | 7,496 |
| 2,752 | 89 | ------- | ---- | 1 | ---- | ------- | ---- | 2,004 | 65 | ------- | ---- | 754 | 24 | ------- | ---- | 7,491 |
| 2,782 | 93 | ------- | ---- | ------- | ---- | ------- | ---- | 1,965 | 66 | ------- | ---- | 861 | 29 | ------- | ---- | 7,447 |
| 2,757 | 89 | ------- | ---- | 1 | ---- | ------- | ---- | 1,782 | 57 | ------- | ---- | 839 | 27 | ------- | ---- | 7,584 |
| 2,477 | 83 | ------- | ---- | ------- | ---- | ------- | ---- | 1,739 | 58 | ------- | ---- | 798 | 27 | ------- | ---- | 7,524 |
| 2,801 | 90 | ------- | ---- | ------- | ---- | ------- | ---- | 1,663 | 54 | ------- | ---- | 802 | 26 | ------- | ---- | 7,860 |

## AND GAS OILS, BY MONTHS, 1927-1928 (THOUSANDS OF BARRELS)

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32,936 | 1,062 | ------- | ---- | 660 | 21 | ------- | ---- | † | | | | 3,732 | 120 | ------- | ---- | ‡23,195 |
| 30,185 | 1,078 | ------- | ---- | 1,053 | 38 | ------- | ---- | ------- | ---- | ------- | ---- | 3,812 | 136 | ------- | ---- | 22,099 |
| 32,377 | 1,044 | ------- | ---- | 525 | 17 | ------- | ---- | ------- | ---- | ------- | ---- | 3,657 | 118 | ------- | ---- | 22,561 |
| 31,856 | 1,062 | ------- | ---- | 805 | 27 | ------- | ---- | ------- | ---- | ------- | ---- | 3,325 | 111 | ------- | ---- | 23,732 |
| 33,499 | 1,081 | ------- | ---- | 826 | 27 | ------- | ---- | ------- | ---- | ------- | ---- | 4,544 | 147 | ------- | ---- | 26,059 |
| 31,691 | 1,056 | ------- | ---- | 851 | 28 | ------- | ---- | ------- | ---- | ------- | ---- | 4,278 | 143 | ------- | ---- | 26,590 |
| 33,693 | 1,087 | ------- | ---- | 849 | 27 | ------- | ---- | ------- | ---- | ------- | ---- | 4,047 | 131 | ------- | ---- | 28,890 |
| 34,098 | 1,100 | ------- | ---- | 391 | 13 | ------- | ---- | ------- | ---- | ------- | ---- | 4,639 | 150 | ------- | ---- | 30,346 |
| 32,339 | 1,078 | ------- | ---- | 341 | 11 | ------- | ---- | ------- | ---- | ------- | ---- | 3,258 | 109 | ------- | ---- | 31,631 |
| 34,045 | 1,098 | ------- | ---- | 667 | 22 | ------- | ---- | ------- | ---- | ------- | ---- | 4,206 | 136 | ------- | ---- | 33,191 |
| 32,594 | 1,086 | ------- | ---- | 704 | 23 | ------- | ---- | ------- | ---- | ------- | ---- | 4,013 | 134 | ------- | ---- | 33,637 |
| 33,029 | 1,065 | ------- | ---- | 451 | 15 | ------- | ---- | ------- | ---- | ------- | ---- | 3,828 | 123 | ------- | ---- | 31,982 |

## EUM WAX, BY MONTHS, 1927-1928 (THOUSANDS OF POUNDS)

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54,114 | 1,746 | ------- | ---- | 460 | 15 | ------- | ---- | 17,452 | 576 | ------- | ---- | 29,228 | 943 | ------- | ---- | 192,835 |
| 47,363 | 1,692 | ------- | ---- | 2,048 | 73 | ------- | ---- | 20,171 | 720 | ------- | ---- | 23,623 | 844 | ------- | ---- | 198,452 |
| 53,644 | 1,731 | ------- | ---- | 910 | 29 | ------- | ---- | 23,461 | 757 | ------- | ---- | 28,205 | 910 | ------- | ---- | 201,340 |
| 48,917 | 1,631 | ------- | ---- | 1,505 | 50 | ------- | ---- | 15,322 | 511 | ------- | ---- | 25,421 | 847 | ------- | ---- | 211,019 |
| 46,267 | 1,492 | ------- | ---- | 729 | 24 | ------- | ---- | 25,458 | 821 | ------- | ---- | 25,228 | 814 | ------- | ---- | 207,329 |
| 44,938 | 1,498 | ------- | ---- | 400 | 13 | ------- | ---- | 29,659 | 989 | ------- | ---- | 24,200 | 807 | ------- | ---- | 198,808 |
| 47,979 | 1,548 | ------- | ---- | 2,789 | 90 | ------- | ---- | 32,105 | 1,036 | ------- | ---- | 25,970 | 838 | ------- | ---- | 191,501 |
| 41,576 | 1,341 | ------- | ---- | 2,656 | 86 | ------- | ---- | 20,859 | 673 | ------- | ---- | 34,229 | 1,104 | ------- | ---- | 180,645 |
| 47,888 | 1,596 | ------- | ---- | 3,040 | 101 | ------- | ---- | 29,621 | 987 | ------- | ---- | 31,780 | 1,059 | ------- | ---- | 170,172 |
| 49,476 | 1,596 | ------- | ---- | 887 | 29 | ------- | ---- | 21,826 | 704 | ------- | ---- | 28,342 | 914 | ------- | ---- | 170,367 |
| 48,146 | 1,605 | ------- | ---- | 3,132 | 104 | ------- | ---- | 17,404 | 580 | ------- | ---- | 32,541 | 1,085 | ------- | ---- | 171,700 |
| 54,039 | 1,743 | ------- | ---- | 11,906 | 61 | ------- | ---- | 29,862 | 963 | ------- | ---- | 30,569 | 986 | ------- | ---- | 167,214 |

omestic demand plus exports. ‡East of California only. †Comparable data not available.

# Advancement in Refinery Technology

## Rapid Progress Made During Past Year in Several Phases of Plant Operation. Many Important Developments Under Way

By Walter Miller*
*Vice President, Marland Refining Co.*

Some of the progress made has been in the development of new furnaces and distilling equipment embodying the more modern principles of boiler practice in obtaining complete combustion of the fuel, low excess air requirements and high transfer rates through the heating surface. Transfer rates of 3,000 to 6,000 British thermal units per square foot per hour were considered good some time ago in the older type of equipment. Today a transfer rate of 25,000 to 35,000 British thermal units is an actual accomplishment in commercial installations and engineers are talking of the feasibility of 50,000, 75,000, even 100,000 British thermal units per hour per square foot. Two of the greatest factors bringing this about have been, first, the rational use of the velocity factor on both the oil and firing side of the heating surface. Second, the study and application of the principles of radiant heat in furnace design.

### Heat Exchange

The principle of heat exchange, especially against oil vapors, has been applied to a greater extent than ever before. The recovery of heat from oil vapors is not new. This was practiced 20 years or more ago in Europe, especially in centers where fuel was scarce and the incentive great. It was not, however, until the development of the modern tubular exchanger became a reality that vapor heat economizers made such headway in the United States. The inefficient, cumbersome and expensive equipment used in most of the few early installations did not pay sufficient return on the investment to justify extensive use, a high maintenance and repair cost also mitigating against a good commercial showing. Being in themselves modifications of the liquid heat exchangers, these early units did not lend themselves to any startling results, temperatures of from 100 to 150 degrees being considered quite satisfactory. The exchangers of today, designed especially for the purpose of vapor to liquid heat transfer, with thin-walled tubes, the design providing for high velocity of both vapors and liquid, have made possible the recovery of a much greater proportion of the heat in the vapor. Oil temperatures of 250 to 500 degrees, with a possibility of still higher preheat, are actually being obtained by the proper co-ordination of vapor heat and residual heat exchangers.

### Removing Heat

Another phase of progress in refining technology, involving the same fundamental principles as the foregoing, but working in a diametrically opposite direction, is the economy resulting from improved methods of removing heat. Examples of this are the use of the thin-walled tubular exchanger as an auxiliary to the condensing apparatus, acting as a final after cooler for the condensed liquids against the colder water. Another example is the use of the same type of equipment as preliminary coolers against cold water in refrigerating systems, and a third, the considerable extension of the practice of using the cold processed refrigerated liquid to pre-cool the fresh oil to be refrigerated.

### Processing Side

Nothing of a startling or revolutionary character seems to have been developed during the year in the realm of the purely processing side of refining. In the matter of fractionation, for illustration, some progress has been made in the further development of the use of side streams for bubble towers, and the production of heavy lubricating oil fractions by the single flash method. No notable improvement over the principle of bubble cap fractionation has been brought out, but the use of bubble towers has been greatly extended, and its superiority over other forms of fractionating towers more generally conceded. Worth-while improvements in the design of bubble towers have been worked out. The construction has been so simplified that a substantial saving in metal, and consequently cost, has been effected. It is not felt, however, that the ultimate has been reached and it is conceivable that the fractionator of five years hence may be as far ahead of today's design as today's design is ahead of that of five years ago.

Some progress has been reported in the treatment of gasoline and gasoline-bearing fractions with sulphuric acid at low temperatures. This method was worked out and is in commercial use in California. It seems to be particularly advantageous in the treatment of cracked distillate from California crude products, which, when treated by the ordinary method, showed very excessive costs and unusually high losses.

### Gasoline Treating

A great deal has been published during the year regarding the chemistry of and reactions involved in the chemical treating and sweetening of gasoline. This work will undoubtedly bear fruit in the future in the application of better methods, but today has not added much to the art in practical development, beyond the better chemical control of the processes made possible by a more thorough understanding of the reactions. There has been a greater extension of the use of the vapor phase filtration method in the refining of cracked gasoline, and an improvement in the technique thereof whereby the yields per ton of clay have been increased to such an extent as to make the fuller's earth cost a negligible factor.

More interest is being displayed in this today than ever before, and it seems quite possible that the use of the process will extend more rapidly in the immediate future. It seems to be particularly valuable in the case of those cracking processes which produce a finished, fractionated gasoline, it being the only method apparently discovered so far giving a finished gasoline of good color, stable to sunlight, which does not require acid treating and consequent redistillation.

The question of desulphurizing gasoline is confronting the refinery engineer today in a more acute form than ever before. The increased producing possibilities of the Permian Salt Basin area of West Texas, with a present daily production of 350,000 bbls., and an estimated potential production of 750,000 bbls., constitutes a serious problem for the future. A great deal of fundamental research as well as cut and dry work has been done along this line, but so far with very little results of practical value.

Some of the newer pools discovered in this area during the present year exaggerate the difficulty by the fact that the straightrun gasoline contains much higher percentages of sulphur than that of the earlier pools, and the sulphur derivatives seem to be of a type that resist removal to a greater extent. For awhile there was some thought that the problems might be alleviated by raising the limit of sulphur tolerance in the official specifications for gasoline. This was quite a live topic during the year, but the result of considerable research and investigation work indicated that there was a real reason for the specification of not over one-tenth of 1 per cent, and that any lowering of the bars would lead to excessive and costly deterioration of internal combustion engines.

### Lubricating Oils

While there has been no outstanding accomplishment in the manufacture of lubricating oils, steady progress has been made along several lines. A number of new plants have been installed, utilizing the contact process of filtration, and on the other hand several installations of the multiple hearth furnace have been made, insuring the more economical operation of the percolating filtration plants connected therewith. So far as I know, no progress has been made toward settling the standing question in contact filtration regarding the respective commercial values of the very expensive acid-treated clays versus raw, natural fuller's earths suitable for the purpose and found in many parts of the United States. Some progress has been made in distillation, such as the single flash bubble tower system, referred to before, and the circulating pipe still, which has proved of value in the Appalachian district.

### Larger Cracking Units

Conditions in cracking are quite similar to the other branches of refining, in that while there has been considerable change in technique and improvement in operation, it has been the result of a steady advance in engineering and operating experience and knowledge rather than as the effect of any new process or even outstanding improvement in existing processes. The trend toward larger units of the established methods is quite pronounced. In some instances more than double the capacity of the previous standard size has been the aim of the newer, larger equipment.

In many plants both the throughput and gasoline production of cracking units previously installed has been considerably increased by taking advantage of some of the new developments brought out during the year. Rearrangement of oil flow through cracking tubes, improvements in furnace design and combustion, a greater degree of perfection in some of the mechanical cleaners for coke chambers, better knowledge of ideal temperature conditions and more desirable distribution of heat through tube banks, all have played their part in this. The value of petroleum coke is becoming better known, and this as well as the fact that cracking plants furnish a dependable source of supply have been responsible for a considerable increase in the outlets for this byproduct.

### Vapor Phase Cracking

Vapor phase cracking has come in for more attention during 1927 than ever before, the revival of interest in this method of producing gasoline synthetically having been rapidly stimulated as the high antiknock value of the product became more generally recognized. Very little commercial use has as yet been made of vapor phase cracking, and it is quite certain that under ordinary conditions it is not yet commercially practicable, even if the resulting gasoline is sold at a considerable premium. A development of considerable interest in this respect was the announcement during the latter part of the year that two of the largest independent oil companies had pooled all the patents owned or controlled by them covering vapor phase cracking, and there is much conjecture as to whether in the event that the method becomes commercially feasible in the future a patent situation analagous to that existing in the pressure cracking process field will arise. Such a situation would undoubtedly act as a deterring factor to the widespread use of these processes.

The active advertising campaign in connection with the most successful antiknock dope, and the resulting search for natural or synthetic gasoline of equal value has had the most important effect in the increased interest in vapor phase cracking. However, in the minds of some refinery engineers, commercial success of the chemical dope question constitutes a considerable hazard to those proposing to install the vapor phase type of commercial cracking unit. It is quite conceivable that if the cost of such synthetic gasoline remains materially higher than that obtained by the pressure cracking processes, installations of the same might easily be rendered commercially unprofitable at some time in the future if the premium charged for doped gasoline were to be substantially reduced as the result of lower cost of manufacture of the dope, consequent upon the larger quantities which will undoubtedly be manufactured as the use of the dope becomes more general.

### Corrosion Control

Work in the field of corrosion prevention or control is being carried on in a more intensive way than ever before. The temporary committee on corrosion of the American Petroleum Institute, which crystallized at the December meeting into a permanent committee, has done much

(Continued on Page 196)

## ECONOMICAL APPLICATION OF HEAT IN REFINING

*In the accompanying paper Mr. Miller, who retires as vice chairman of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers, in charge of refinery engineering, summarizes the progress made in refinery technology during the past year, with a discussion of some of the probable future developments.*

*Regarding the past year Mr. Miller says:*

*"During no similar period in the development of petroleum refining technology has so much progress been made in methods and equipment for the economical utilization of heat. Drastically severe commercial and economical conditions controlling the refining industry during 1927 gave a great impetus to better efficiency and greater economical operation in all departments. I think it is fair to say, however, that more progress has been made in the department of heat utilization than in other branches. I use the word utilization advisedly in the dual sense of better primary generation and application of heat and of saving by recovery methods. It was because of this trend that the subject of the 'Economical Application of Heat' was made the keynote of the refinery engineering sessions just completed."*

*New York meeting of A.I.M.E. Copyright, American Institute of Mining and Metallurgical Engineers, Inc.

# 1928 Refinery Survey, Covering Personnel of Co

**ABBREVIATIONS USED IN TABLES**

Complete plant (Comp.)—Gasoline, kerosene, gas and fuel oils, lubricating oils, paraffin wax, petroleum coke, asphalt or both coke and asphalt, usually includes cracking. In Pennsylvania some plants listed as complete do not manufacture asphalt or coke.

Skimming plant (S)—Gasoline, kerosene, gas and fuel oils.

Skimming and lub (S&L)—Gasoline, kerosene, gas and fuel oils, lubricating oils.

Skimming and asphalt (S&A)—Gasoline, kerosene, gas and fuel oils, asphalt.

Skimming, lub and asphalt (SL&A)—Gasoline, kerosene, gas and fuel oils, lubricating oils, asphalt.

Wax plant (Wax)—Gasoline, kerosene, gas and fuel oils, lubricating oils, paraffin wax.

Lub plant (L)—Gas and fuel oils, lubricating oils.

Asphalt plant (A)—Distillates, gas and fuel oils, asphalt.

Topping plant (T)—Tops, distillates, gas and fuel oils.

Cracking (C)—Same products as skimming.

**MAILING ADDRESS**

With the exception of the plant superintendents, the mailing address of the company personnel listed in this report is the general office of the company. The plant superintendents are reached both at the general office and plant address.

## ARIZ

| Name and General Offices— | President | Vice President | Secretary | Treasurer |
|---|---|---|---|---|
| Rio Grande Oil Co., Los Angeles, Calif. | L. E. Lockhart | A. M. Lockhart[1] | L. M. Lockhart | Charles S. Jones |

[1]H. L. Lockhart, vice president, Rio Grande Oil Co.

## ARK

| | | | | |
|---|---|---|---|---|
| Henry H. Cross Co., 936 Peoples Gas Building, Chicago | H. H. Cross | George F. Fox | | |
| Kettle Creek Refining Co., Atlas Life Building, Tulsa, Ok'a. | W. B. Hassett | S. H. Fredericks | W. E. N. Phillips | W. B. Hassett |
| Lion Oil Refining Co., Kansas City, Mo.; El Dorado, Ark. | E. C. Winters | H. M. Breidenthal | H. M. Briedenthal | E. C. Winters |
| Macmillan Petroleum Products Co., 530 W. Sixth St., Los Angeles | See California | See California | See California | See California |
| Ouachita Valley Refining Co., Eldorado | John E. Shatford* | Edward V. Stockham | Eloise Wall | C. L. Crenshaw |
| Root Refineries, Inc., Shreveport, La. | D. S. Brooks | D. P. Hamilton | D. P. Hamilton | D. S. Brooks |
| Simms Oil Co., Magnolia Building, Dallas | See Texas | See Texas | See Texas | See Texas |

[1]O. B. Bingham, manager, Henry H. Cross Co., Smackover.

[2]General superintendent of refineries; J. K. McKinnon, assistant superintendent.

## CALI

| | | | | |
|---|---|---|---|---|
| Associated Oil Co., 79 New Montgomery Street, San Francisco | W. F. Humphrey | L. F. Bayer[1] | P. G. Williams | W. A. Sloan |
| Associated Oil Co., 79 New Montgomery Street, San Francisco | See Above | See Above | See Above | See Above |
| California Eastern Oil Co., Los Angeles | Joseph Scott[16] | | | |
| California Petroleum Corp., Security Building, Los Angeles | Jacques Vinmont* | C. E. Olmstead[2] | D. E. O'Brien | W. D. Stewart |
| California Petroleum Corp., Security Building, Los Angeles | See Above | See Above | See Above | See Above |
| California Petroleum Corp., Security Building, Los Angeles | See Above | See Above | See Above | See Above |
| General Petroleum Corp., Los Angeles | L. T. Barneson | R. A. Sperry*[4] | D. W. Woods | J. Leslie Barneson |
| General Petroleum Corp., Los Angeles | See Above | See Above | See Above | See Above |
| General Petroleum Corp., Los Angeles | See Above | See Above | See Above | See Above |
| Gilmore Oil Co., 2423 East Twenty-eighth Street, Los Angeles | Earl B. Gilmore | C. S. Beesemyer[5] | S. M. Salisbury | C. S. Beesemyer[5] |
| Gilmore Oil Co., 2423 East Twenty-eighth Street, Los Angeles | See Above | See Above | See Above | See Above |
| Hancock Oil Co., 1015 Security Building, Long Beach, Calif. | Will J. Reid | J. W. Hancock* | W. N. Reagan | A. C. Malone |
| Hercules Gasoline Co., Fresno | A. Mattei, Sr. | | S. W. Harkleroad | A. Mattei, Jr. |
| Macmillan Petroleum Products Co., 530 West Sixth Street, Los Angeles | R. S. Macmillan | S. M. Batterson | Dewitt Knox | Dewitt Knox |
| Olympic Refining Co., Burnett | Charles P. Ritter* | W. W. Shorthill | D. T. Buckley | D. T. Buckley |
| Pan American Petroleum Co., Los Angeles | J. C. Anderson | Chas. E. Harwood[17] | Fred Ritter | E. L. Doheny, Jr. |
| Paraffine Companies, Inc., 475 Braman Street, San Francisco | R. S. Moore | R. S. Shainwald | R. H. Rhea | S. C. Irvin |
| Richfield Oil Co. of California, Los Angeles | J. A. Talbot | C. M. Fuller*[8] | C. A. Madary | W. E. Hart |
| Richfield Oil Co. of California, Los Angeles | See Above | See Above | See Above | See Above |
| Richfield Oil Co. of California, Los Angeles | See Above | See Above | See Above | See Above |
| Richfield Oil Co. of California, Los Angeles | See Above | See Above | See Above | See Above |
| Richfield Oil Co. of California, Los Angeles | See Above | See Above | See Above | See Above |
| Rio Grande Oil Co., 714 South Hill Street, Los Angeles | L. E. Lockhart | A. M. Lockhart | L. M. Lockhart | Charles S. Jones |
| Seaboard Petroleum Corp., 2474 East Ninth Street, Los Angeles | Alfred L. Black, Jr. | J. M. Feldman* | W. J. Batchelder | W. J. Batchelder |
| Seaside Oil Co., Summerland | A. M. Heineman | J. F. Bushnell | M. W. O'Brien | J. F. Bushnell[9] |
| Seaside Oil Co., Summerland | See Above | See Above | See Above | See Above |
| Shell Oil Co. of California, 200 Bush Street, San Francisco | C. Legh-Jones | H. R. Gallagher[18] | G. C. Noble | John Lauder |
| Shell Oil Co. of California, 200 Bush Street, San Francisco | | | | |
| Shell Oil Co. of California, 200 Bush Street, San Francisco | | | | |
| Standard Oil Co. of California, 225 Bush Street, San Francisco | K. R. Kingsbury | R. J. Hanna[3] | J. H. Tuttle | R. C. Warner |
| Standard Oil Co. of California, 225 Bush Street, San Francisco | See Above | See Above | See Above | See Above |
| Standard Oil Co. of California, 225 Bush Street, San Francisco | See Above | See Above | See Above | See Above |
| St. Helens Petroleum Co., Ltd., The, 1204 Western Pacific Building, Los Angeles[15] | H. H. Haldin | | R. H. Young | |
| Union Oil Co. of California, Union Oil Building, Los Angeles | W. L. Stewart | E. W. Clark[10] | John McPeak | R. J. Keown |
| Union Oil Co. of California, Union Oil Building, Los Angeles | See Above | See Above | See Above | See Above |
| Union Oil Co. of California, Union Oil Building, Los Angeles | See Above | See Above | See Above | See Above |
| Union Oil Co. of California, Union Oil Building, Los Angeles | See Above | See Above | See Above | See Above |
| Union Oil Co. of California, Union Oil Building, Los Angeles | See Above | See Above | See Above | See Above |
| Union Oil Co. of California, Union Oil Building, Los Angeles | See Above | See Above | See Above | See Above |
| Vernon Oil Refining Co., 2500 East Twenty-sixth Street, Los Angeles | J. A. Brower* | H. S. Penn | W. N. Brower | W. N. Brower |
| Western Oil & Refining Co., Commercial Exchange Building, Los Angeles | Richard Florian* | R. R. Rakestraw | A. A. G. Scherbel | A. A. G. Scherbel |
| Wilshire Oil Co., Inc., Vernon | George L. Machris | Alfred P. Machris | Victor A. Machris | Alfred P. Machris |
| Wilshire Oil Co., Inc., Vernon | See Above | See Above | See Above | See Above |

*General manager. †Under construction.
[1]A. C. McLaughlin, F. B. Henderson, L. D. Jurs, L. J. King, vice presidents.
[2]E. Whitehead, manager fuel oil sales.
[3]F. C. Van Deinse, F. V. Gordon, C. L. Coppage, L. B. O'Neil, vice presidents.
[4]R. E. Maynard, W. L. McLaine, E. R. Rich, vice presidents.
[5]Sales manager export department.
Sales manager, service stations and refined oils.
[8]S. M. Salisbury, vice president.
[9]John McKeon, J. S. Wallace, vice presidents.
[10]H. M. Storey, H. T. Harper, W. H. Berg, vice presidents.

## COL

| | | | | |
|---|---|---|---|---|
| Continental Oil Co., 1755 Glenarm Street, Denver | S. H. Keoughan | W. H. Ferguson[2] | H. P. Ferree | G. F. Smith |
| Raven Oil & Refining Co., Vernal, Utah | John W. Leonard | F. G. Cary | R. A. Bryson[1] | R. A. Bryson |
| Texas Company, The, Houston, Tex. | See Texas | See Texas | See Texas | See Texas |

*General manager.

[1]R. A. Bryson in charge of all operations.

## GE

| | | | | |
|---|---|---|---|---|
| Atlantic Refining Co., 260 South Broad Street, Philadelphia, Pa. | See Pennsylvania | See Pennsylvania | See Pennsylvania | See Pennsylvania |

# Companies and Plants Operating in the United States

### CRACKING PROCESSES

Following is a list of cracking processes, including owners and sales representatives:

Burton—Standard Oil Co. of California, 910 South Michigan Ave., Chicago, Ill.

Cross—Gasoline Products Co., 700 Baltimore Avenue, Kansas City, Mo.; M. W. Kellogg Co., 7 Dey Street, New York, N. Y. Latter company controls process covered by Black patents.

Dubbs—Universal Oil Products Co, 310 South Michigan Avenue, Chicago, Ill.

Fleming—M. W. Kellogg Co., 7 Dey Street, New York, N. Y.

Holmes-Manley—The Texas Company, 17 Battery Place, New York, N. Y.

Isom—Sinclair Refining Co., 45 Nassau Street, New York, N. Y.

Jenkins—Jenkins Petroleum Process Co., 844 Rush Street, Chicago, Ill.; Graver Corp., East Chicago, sales representative.

Tube & Tank—Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y.

In addition to the above, there are several processes listed in the following tables which are generally owned by the companies operating the refineries at which they are installed.

## ARIZONA

| Name of Company | Plant Loc. | Crude Capacity | Type Plant | Cracking Capacity | Type Cracking Unit | Plant Superintendent | Sales Managers: Tank Car | Sales Managers: Bulk and Service Station | Purchasing Agent |
|---|---|---|---|---|---|---|---|---|---|
| Rio Grande Oil Co. | Phoenix | 600 | S | .... | | Lynn Lockhart | J. N. Reed | J. N. Reed | |

## ARKANSAS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Henry H. Cross Co. | Smackover | 4,000 | S | .... | | C. L. Murphy[1] | H. H. Cross | H. H. Cross | |
| Kettle Creek Refining Co. | El Dorado | 3,000 | S&C | 1,500 | Dubbs | C. M. Alexander | E. C. Prator | | C. M. Alexander |
| Lion Oil Refining Co. | El Dorado | 12,000 | S&C | 4,000 | Burton | Sylvester Dayson | H. M. Briedenthal | H. M. Briedenthal | H. M. Briedenthal |
| Macmillan Pet. Prod. Co. | El Dorado | 1,500 | S | .... | | | See California | See California | |
| Ouachita Valley Refg. Co. | El Dorado | 1,000 | S&C | 700 | Dubbs | H. J. Shatford | C. L. Crenshaw | | C. L. Crenshaw |
| Root Refineries, Inc. | El Dorado | 3,500 | S&C | 1,500 | Dubbs | Ed Kimes[2] | J. C. Watkins | | F. E. Bearce |
| Simms Oil Co. | Smackover | 2,500 | S&C | 2,000 | Cross | F. N. Williams | See Texas | See Texas | |

[1]General manager.

## CALIFORNIA

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Associated Oil Co. | Avon | 60,000 | S&L | | | W. P. Hugo | F. M. Rowles | F. M. Rowles | A. P. Mac Killop[3] |
| Associated Oil Co. | Watson | 10,000 | S&L | | | F. E. Coyle | See Above | See Above | See Above |
| California Eastern Oil Co. | Vernon | 8,500 | S-L | .... | | Frank Miller | | | |
| California Petroleum Corp. | Watson | 30,000 | T-C | 2,000 | Holmes-Manley | W. J. Ryan | C. L. Coppage | C. L. Coppage | C. W. Chandler |
| California Petroleum Corp. | Fillmore | 5,000 | Comp. | .... | | J. R. Scanlin | See Above | See Above | See Above |
| California Petroleum Corp. | Coalinga | 1,000 | T | .... | | V. Easley | See Above | See Above | See Above |
| General Petroleum Corp. | Vernon | 55,000 | Comp. | 3,000 | Vapor Phase | Fred Isaacs | E. R. Rich | E. R. Rich | R. M. Ketchum |
| General Petroleum Corp. | Lebec | 10,000 | T | .... | | G. L. Rateliffe | See Above | See Above | See Above |
| General Petroleum Corp. | Olinda | 3,000 | T | .... | | G. L. Rateliffe | See Above | See Above | See Above |
| Gilmore Oil Co. | Vernon | 3,500 | T | .... | | W. C. Minger | J. L. Coates[6] | B. A. Rowell[7] | Charles P. Boone |
| Gilmore Oil Co. | Los Angeles | 2,500 | A | .... | | Scott Beach | | See Above | See Above |
| Hancock Oil Co. | Long Beach | 7,500 | S | .... | | H. D. Tupper | George D. Williams | George D. Williams | J. W. Hancock |
| Hercules Gasoline Co. | Los Angeles | 5,000 | S | .... | | Platt May | C. R. Bird* | S. V. Millington | R. E. Hawley |
| Macmillan Petr. Products Co. | Long Beach | 4,000 | S | .... | | C. C. Benz | Alfred Macmillan | M. P. Macmillan | S. M. Batterson |
| Olympic Refining Co. | Burnett | 5,000 | S | .... | | T. J. Ryan | | | M. I. Wyatt |
| Pan American Petroleum Co. | Watson | 70,000 | Comp. | 10,000 | Black | W. D. Rial | J. T. Armitage | | |
| Paraffine Companies, Inc. | Emeryville | 1,200 | A | .... | | | | | |
| Richfield Oil Co. of Calif. | Rioreo | 45,000 | S-C | 12,500 | Cross | A. M. Kelly[14] | J. C. Graves | J. C. Graves | M. A. Peterson |
| Richfield Oil Co. of Calif. | Huntington Beach | 4,500 | S | .... | | | See Above | See Above | See Above |
| Richfield Oil Co. of Calif. | Los Angeles | 4,000 | S | .... | | | See Above | See Above | See Above |
| Richfield Oil Co. of Calif. | Bakersfield | 2,000 | S | .... | | | See Above | See Above | See Above |
| Richfield Oil Co. of Calif. | Fellows | 6,500 | S | .... | | | See Above | See Above | See Above |
| Rio Grande Oil Co. | Los Angeles | 4,000 | S | .... | | C. C. Downey | J. N. Reed | J. N. Reed | |
| Seaboard Petroleum Corp. | Los Angeles | 2,000 | S | .... | | William Rorrison | E. L. Duntley | W. G. Harton | F. W. Retting |
| Seaside Oil Co. | Summerland | 2,000 | A | .... | | D. C. Peet | | Winslow Bushnell | |
| Seaside Oil Co. | Ventura | 3,000 | S | .... | | | See Above | See Above | |
| Shell Oil Co. of California | Martinez | 33,000 | Comp. | 9,000 | | | | | |
| Shell Oil Co. of California | Wilmington | 50,000 | Comp. | 8,000 | | | | | |
| Shell Oil Co. of California | Dominguez | 24,000 | S-C | 17,500 | | | | | |
| Standard Oil Co. of California | Richmond | 100,000 | Comp. | 17,500 | Dubbs | | | | |
| Standard Oil Co. of California | El Segundo | 100,000 | Comp. | †24,000 | Dubbs | | | | |
| Standard Oil Co. of California | Bakersfield | 25,000 | S&A | .... | | | | | |
| St. Helens Pet. Co.,Ltd., The | Whittier | 3,000 | S-T | .... | | C. Z. Webb | Charles Drader* | Charles Drader | Charles Drader |
| Union Oil of California | Avila[11] | 10,000 | T | .... | | A. G. Page[12] | J. M. Geary | J. M. Geary | H. C. Farquhar |
| Union Oil of California | Brea | 5,000 | S | .... | | | See Above | See Above | See Above |
| Union Oil of California | Los Angeles | 50,000 | S&A | 10,000 | Cross | | See Above | See Above | See Above |
| Union Oil of California | Oleum | 28,000 | S-A-L | .... | | | See Above | See Above | See Above |
| Union Oil of California | Santa Paula | 1,000 | S | .... | | | See Above | See Above | See Above |
| Union Oil of California | Maltha | 3,000 | S | .... | | | See Above | See Above | See Above |
| Vernon Oil Refining Co. | Los Angeles | 3,000 | S | .... | | | | P. T. Hinman | |
| Western Oil & Refining Co. | Wilmington | 10,000 | S-C | 800 | Jenkins | E. J. McKee | A. A. G. Scherbel | A. A. G. Scherbel | L. J. Hart |
| Wilshire Oil Co., Inc. | Vernon | 10,000 | S | .... | | Charles E. Jones[15] | | M. M. Fletcher | William T. Layman |
| Wilshire Oil Co., Inc. | Fellows | 2,500 | S | .... | | | | See Above | See Above |

[10]W. W. Orcutt, L. P. St. Clair, vice presidents Union Oil Co. of California; Comptroller R. D. Matthews; assistant comptrollers, G. H. Forster, J. M. Hannay, A. B. Mason.

[11]Avila plant operating part capacity.

[12]Manager of refineries; P. N. Boggs, assistant general manager.

[13]W. D. Smith, manager of operations.

[14]Superintendent of refineries.

[15]Main office of corporation at Kern House, 36 Kingsway, London, England. W. W. Orcutt in charge of American office.

[16]Joseph Scott and H. L. Carnahan, receivers.

[17]Cecil A. Elliott, E. L. Doheny, Jr., vice presidents, Pan American Petroleum Co.

[18]John Sander, vice president, Shell Oil Co. of California.

## COLORADO

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Continental Oil Co. | Florence | 2,500 | S-C | 1,400 | Burton | F. E. Knoch[3] | | | P. R. Naylor |
| Raven Oil & Refining Co. | Rangely | 200 | S | .... | | R. A. Bryson* | | | |
| Texas Company, The | Craig | 750 | Comp. | 500 | Holmes-Manley | G. O. Shefstead | See Texas | See Texas | See Texas |

[3]E. S. Karstedt, vice president.

[3]A. D. David, general manager of refineries; F. L. Herle, general superintendent of refineries.

## GEORGIA

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Atlantic Refining Co. | Brunswick | 5,000 | Comp. | 2,000 | Lewis | See Pennsylvania | See Pennsylvania | See Pennsylvania | See Pennsylvania |

# 1928 Refinery Survey, Covering Personnel of Co

## ILL

| Name and General Offices— | President | Vice President | Secretary | Treasurer |
|---|---|---|---|---|
| Barber Asphalt Co., 1600 Arch Street, Philadelphia, Pa. | See New Jersey | See New Jersey | See New Jersey | See New Jersey |
| Henry H. Cross Co., 936 Peoples Gas Building, Chicago | See Arkansas | See Arkansas | See Arkansas | See Arkansas |
| Indian Refining Co., Lawrenceville | James H. Graham | B. H. Anglin[1] | D. G. Siemer | R. J. Dillon |
| Lincoln Oil Refining Co., Robinson | J. K. Kerr | H. B. Carpenter | W. B. Filson | F. A. Billstone |
| Lubrite Refining Co., 3504 Washington Blvd., St. Louis, Mo. | W. W. Strickler | H. T. Ashton*[2] | A. T. Alison | A. T. Alison |
| Red River Refining Co., Inc., 77 West Washington Street, Chicago | Thomas Flynn* | E. F. Buchanan | John E. Schulze | E. F. Buchanan |
| Roxana Petroluem Corp., Shell Building, St. Louis, Mo. | F. Godber | T. F. Lydon | P. R. Chenoweth | P. R. Chenowe |
| Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago | See Indiana | See Indiana | See Indiana | See Indiana |
| Texas Company, The, Houston, Tex. | See Texas | See Texas | See Texas | See Texas |
| White Star Refining Co. (of Delaware), Detroit, Mich. | Harry B. Earhart | H. A. Coffin[1] | C. B. McCullough | W. V. Butler |

*General manager.
[1]Frank Fritts, vice president.
[2]H. L. Deming, general manager.
[3]W. H. Ware, vice president.

## IND

| | | | | |
|---|---|---|---|---|
| Bartles-Maguire Oil Co., Milwaukee, Wis. | A. G. Maguire | H. J. Stolz*[1] | R. W. Fritzke, Jr. | R. W. Fritzke, |
| Roxana Petroleum Corp., Shell Building, St. Louis, Mo. | See Illinois | See Illinois | See Illinois | See Illinois |
| Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago | E. G. Seubert | B. Park[2] | F. T. Graham | C. J. Barkdull |
| Sinclair Refining Co., 45 Nassua Street, New York | E. W. Sinclair | | A. Steinmetz | J. Fletcher Farrell |

*General manager.
[1]J. M. McLaughlin, F. H. Mayfield, vice presidents.

## KAN

| | | | | |
|---|---|---|---|---|
| Barnsdall Refineries, Inc., Petroleum Building, Tulsa, Okla. | See Oklahoma | See Oklahoma | See Oklahoma | See Oklahoma |
| Derby Oil & Refining Co., Wichita | A. L. Derby* | R. E. Wilsey[1] | E. Wasser | E. C. Claiborne |
| Eldorado Refining Co., Eldorado | C. G. Yankey | Robert H. Hazlett | T. A. Helling* | Robert H. Bradford |
| Golden Rule Refining Co., Wichita | Elbert S. Rule* | | W. C. Long. | W. C. Long |
| Kanotex Refining Co., Arkansas City | John McEwen Ames | Clyde M. Boggs* | E. K. Childers | R. R. Cox |
| Manhattan Oil Co., Security Building, Kansas City, Mo. | E. W. Goebel* | J. P. Howe[2] | James F. Getty | E. L. Martin |
| National Refining Co., National Building, Cleveland, Ohio | See Ohio | See Ohio | See Ohio | See Ohio |
| Peerless Oil & Refining Co., Chanute | F. E. Reinhardt* | Elmer M. Cooper | C. O. Nelson | C. O. Nelson |
| Roxana Petroleum Corp., Shell Building, St. Louis, Mo. | See Illinois | See Illinois | See Illinois | See Illinois |
| Sinclair Refining Co., 45 Nassau, New York | See Indiana | | | |
| Sinclair Refining Co., 45 Nassau, New York | See Indiana | | | |
| Skelly Oil Co., Skelly Building, Tulsa, Okla. | W. G. Skelly | C. C. Herndon[3] | F. T. Hopp | F. T. Hopp |
| Standard Oil Co. of Kansas, Neodesha | A. S. Hopkins* | E. A. Warren | A. L. Morrison | A. L. Morrison |
| Vickers Petroleum Co., Wichita | J. A. Vickers | C. L. Hindman | John S. Wertz | John S. Wertz |
| White Eagle Oil & Refining Co., Kansas City, Mo. | L. L. Marcell | R. R. Irwin | Milo T. Jones | A. N. Allen |

*General manager.
[1]H. A. Miller, purchasing agent at Eldorado; F. W. Robertson at Tulsa.
[2]E. C. Moriarty, vice president.

## KENT

| | | | | |
|---|---|---|---|---|
| Aetna Oil Service, Inc., 1202 South Third Street, Louisville | Martin J. Quinn | Curtis C. Webb* | H. J. Flanders | A. T. Judy |
| Ashland Refining Co., Inc., Ashland | Thomas A. Combs | Paul G. Blazer | E. L. McDonald | R. W. Grossenbach |
| Glasgow Oil & Refining Co., Gasgow | R. B. Tyler | T. P. Dickinson | Sewell C. Harlin* | Sewell C. Harlin |
| Louisville Refining Co., Louisville | W. S. Dudley | Eli H. Brown, Jr.[1] | H. R. Smith | H. R. Smith |
| Stoll Oil Refining Co., Louisville | C. C. Stoll | George Stoll[2] | William A. Stoll | William A. Stol |
| Texas Company, The, Houston, Tex. | See Texas | See Texas | See Texas | See Texas |

*General manager.
[1]J. Fred Miles, vice president and general manager.

## LOUI

| | | | | |
|---|---|---|---|---|
| Bayou State Refining Co., Shreveport | Being organized | | | |
| Chalmette Petroleum Corp., 610 Union Indemnity Building, New Orleans | W. E. Winship* | W. Irving Moss[1] | R. P. Batson | William Leftwich |
| Crystal Oil Refining Corp., Shreveport | G. L. Estabrook | F. W. Burford* | Frank T. Clark | Frank T. Clark |
| Dartois Oil Refinery, Fourteenth Floor Slattery Building, Shreveport | Not Incorporated | Not Incorporated | Not Incorporated | Not Incorporated |
| Dixie Oil Co., Inc., Shreveport | F. H. Wickett | N. M. Hancock | E. G. Seubert | E. G. Seubert |
| Liberty Oil Co., Ltd., New Orleans | Thomas C. Anderson | H. D. Smith, Jr. | P. A. Lavendan | L. P. Samsot |
| Louisiana Oil Refining Corp., Shreveport | R. B. Kahle | M. J. Grogan*[12] | C. R. Harrison | A. F. Whiting |
| Louisiana Oil Refining Corp., Shreveport | See Above | See Above | See Above | See Above |
| New Orleans Refining Co., Inc., 900 United Fruit Building, New Orleans | R. Airey | A. Fraser[2] | A. Fraser | A. W. Houston |
| Mexican Petroleum Corp. of Louisiana, 120 Broadway, New York City | R. G. Stewart* | P. H. Harwood[3] | L. W. Bernhard | A. N. Penn |
| Shreveport Producing & Refining Corp., Commercial Bank Building, Shreveport | C. D. Keen | J. B. Atkins*[5] | Bradford Hearn | Bradford Hearn |
| Sinclair Refining Co. of Louisiana, 45 Nassua Street, New York City | A. E. Watts | W. L. MacGready*[9] | A. Steinmetz | C. C. Vaughn |
| Standard Oil Co. of Louisiana, Baton Rouge | D. R. Weller | A. K. Gordon[10] | J. A. Bechtold | A. K. Gordon |
| Texas Company, The, Houston, Tex. | See Texas | See Texas | See Texas | See Texas |

*General manager.
[1]B. C. McClellan, Charles Leftwich, C. D'Antoni, vice presidents.
[2]J. E. Slattery, general manager.
[3]L. Van Eeghen, vice president and general manager.
[4]Sales manager gasoline.
[5]Sales manager fuel oils.
[7]Harold Walker, J. S. Wood, Frederic Ewing, vice presidents.
[9]G. M. Whalen, south; E. Neilson, north.

## MARY

| | | | | |
|---|---|---|---|---|
| Pan American Petroleum & Transport Co., 120 Broadway, New York, N. Y. | See Louisiana | See Louisiana | See Louisiana | See Louisiana |
| Prudential Oil Corp., 90 West Street, New York, N. Y. | J. O. Jensen | W. V. Griffin | Elton Parks | E. W. Freeman |
| Standard Oil Co. of New Jersey, 26 Broadway, New York City | See New Jersey | See New Jersey | See New Jersey | See New Jersey |

## MASSAC

| | | | | |
|---|---|---|---|---|
| Beacon Oil Co., Everett | R. B. Kahle | W. F. Dunning[1] | H. W. Boutilier | W. F. Dunning |
| Cities Service Refining Co., 209 Washington Street, Boston | Henry L. Doherty | Harry D. Frueauff[2] | John D. Griffin[4] | L. F. Musil |
| New England Oil Refining Co., Fall River | A. F. Carter | J. L. Darnell* | E. T. Kirlin | A. F. Carter |

*General manager.
[1]E. W. Wrightington, L. J. Walsh, G. E. Hite, Jr., vice presidents.
[2]H. H. Hewetson, manager of refineries.
[3]F. F. Hole, general sales manager.

# mpanies and Plants Operating in the United States

## NOIS

| Name of Company | Plant Loc. | Crude Capacity | Type Plant | Cracking Capacity | Type Cracking Unit | Plant Superintendent | Sales Managers: Tank Car | Sales Managers: Bulk and Service Station | Purchasing Agent |
|---|---|---|---|---|---|---|---|---|---|
| Barber Asphalt Co. | Madison | 700 | A | .... | | L. S. Sweeney | See New Jersey | See New Jersey | |
| Henry H. Cross | Joliet | 2,500 | S | .... | | M. L. Berryman | H. H. Cross | H. H. Cross | |
| Indian Refining Co. | Lawrenceville | 12,000 | Comp. | 10,000 | Dubbs Cross | P. P. Wells | B. H. Anglin | | F. B. Upham |
| Lincoln Oil Refining Co. | Robinson | 5,000 | Comp. | 5,000 | Holmes-Manley | R. E. Luton[2] | N. T. Stover | N. T. Stover | H. B. Carpenter |
| Lubrite Refining Co. | East St. Louis | 3,000 | S-C | 1,200 | Fleming | D. A. Windsor[4] | Earl Whatley | W. H. Ware | J. H. MacCrea |
| Red River Refining Co. | Burnham | 500 | S&L | .... | | R. S. Watt | E. F. Buchanan | | |
| Roxana Petroleum Corp. | Wood River | 40,000 | T-C-L | 14,000 | Dubbs Cross | F. W. L. Tydeman | G. G. Woodruff | G. G. Woodruff | C. B. Singleton |
| Standard Oil Co. of Indiana | Wood River | 20,000 | Comp. | 20,000 | Burton Holmes-Manley | C. B. Manbeck | See Indiana | See Indiana | |
| Texas Company, The | Lockport | 6,000 | Comp. | 6,600 | Holmes-Manley | G. B. Bogart | See Texas | See Texas | See Texas |
| White Star Ref. Co. of Del. | Wood River | 5,000 | S-C | 2,700 | Dubbs | J. B. Edwards[6] | C. B. McCullough | L. R. Hunter | H. M. Sullivan[7] |

[1]R. A. Frevert, chief engineer.
[2]L. R. Hunter, Richard Earhart, vice presidents.
[6]General manager of refineries.
[7]S. V. Fahner, traffic manager.

## ANA

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Bartles-Maguire Oil Co. | East Chicago | 2,500 | S-C | 3,000 | Jenkins | William Hildebrandt | L. B. Patterson | J. H. McLaughlin | H. A. Steffen |
| Roxana Petroleum Corp. | East Chicago | 27,000 | T-C | 8,000 | Dubbs | R. H. Waser | See Illinois | See Illinois | |
| Standard Oil Co. of Indiana | Whiting | 52,000 | Comp. | 50,000 | Burton Holmes-Manley | G. Cash | Amos Ball | Amos Ball | J. F. Hewson |
| Sinclair Refining Co. | East Chicago | 24,000 | S-L-C | 35,000 | Isom | | | | H. B. Malone |

[2]Allan Jackson, R. H. McElroy, E. J. Bullock, vice presidents.

## SAS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Barnsdall Refineries, Inc. | Wichita | 4,000 | S-C | 2,000 | Dubbs | F. S. Horne | See Oklahoma | See Oklahoma | See Oklahoma |
| Derby Oil & Refining Co. | Wichita | 6,000 | C | 2,000 | Dubbs | Eugene Sapp | C. A. Keller | | Clayton Garvey |
| Eldorado Refining Co. | Eldorado | 3,500 | S | .... | | G. C. Anderson | T. A. Helling | | T. A. Helling |
| Golden Rule Refining Co. | Wichita | 1,500 | S-C | 1,000 | Jenkins | W. C. Long | W. C. Long | | |
| Kanotex Refining Co. | Arkansas City | 10,000 | S-C | 2,500 | Jenkins | T. A. Deering | W. L. Lesh | | H. A. Schramm |
| Manhattan Refining Co. | Kansas City | 6,000 | S-C | 2,000 | Wellman | Frank E. Wellman | M. A. Lysaught | J. P. Howe | Joseph Evans |
| National Refining Co. | Coffeyville | 6,000 | S-C | 3,000 | National | H. B. Setzler | See Ohio | See Ohio | See Ohio |
| Peerless Oil & Refining Co. | Chanute | 3,000 | S-C | 1,600 | Jenkins | A. G. Sevy | G. S. Reinhardt | J. E. Lassman | J. E. Wood |
| Roxana Petroleum Corp. | Arkansas City | 20,000 | T-C | 6,000 | Dubbs | R. B. High | See Illinois | See Illinois | |
| Sinclair Refining Co. | Coffeyville | 10,000 | S-C | 10,000 | Isom | B. J. Healy | See Indiana | | |
| Sinclair Refining Co. | Argentine | 8,000 | S-C | 10,000 | Isom | George Bibbington | See Indiana | | |
| Skelly Oil Co. | Eldorado | 23,000 | S-C | 13,000 | Jenkins Cross | K. J. Smith | G. A. R. Slocum | W. T. Atkins | F. W. Robertson[5] |
| Standard Oil Co. of Kansas | Neodesha | 12,000 | S-C-A | 12,000 | Burton Holmes-Manley | E. A. Metcalf | | | W. H. Hill |
| Vickers Petroleum Co. | Potwin | 3,000 | S-C | 1,200 | Dubbs | A. M. Schnepper | C. W. Rice | | H. G. Shaw |
| White Eagle Oil & Ref. Co. | Augusta | 10,000 | S-C | 2,500 | Burton | C. C. Durkee | H. L. McReynolds | R. D. Mering | W. C. Etsbach |

[2]O. G .Bitler, vice president.
[5]F. A. Pielsticker, H. M. Stalcup, vice presidents.

## UCKY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Aetna Oil Service, Inc. | Louisville | 2,000 | S-C | 400 | Fleming | E. E. Van Buren | H. J. Flanders | Julius Malkemus | A. T. Judy |
| Ashland Refining Co., Inc. | Ashland | 3,500 | S-C | 1,000 | Dubbs | F. W. Irwin | Paul G. Blazer[9] | | R. W. Grossenbach |
| Glasgow Oil & Ref. Co. | Glasgow | 400 | S | .... | | M. R. Rippy | | | |
| Louisville Refining Co. | Louisville | 3,000 | S-C | 1,500 | Dubbs | C. A. Jouett | H. R. Smith | | C. A. Jouett |
| Stoll Oil Refining Co. | Louisville | 1,500 | L | .... | | J. W. Kittner | Berry V. Stoll | George Stoll | William A. Stoll |
| Texas Company, The | Pryse | 3,000 | Comp. | .... | | W. H. Hoffman | See Texas | See Texas | See Texas |

[2]Berry V. Stoll, Charles E. Stoll, vice presidents.

## SIANA

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Bayou State Refining Co. | Shreveport | 600 | S | .... | | J. P. Knox | | | |
| Chalmette Petroleum Corp. | Chalmette | 4,000 | T | .... | | E. J. Mary | George P. Gillette | | |
| Crystal Oil Refining Corp. | Shreveport | 14,000 | S-C | 3,000 | Jenkins | John J. Thomas | R. E. Bishop | W. T. Leeper | George B. Pinchera |
| Dartois Oil Refinery | Shreveport | 80 | L | .... | | Peter J. Dartois[2] | | | |
| Dixie Oil Co., Inc. | Superior[11] | 2,500 | S | .... | | | | | R. B. Rice |
| Liberty Oil Co., Ltd. | New Orleans | 4,000 | S | .... | | | | | |
| Louisiana Oil Ref. Corp. | Bossier City | 13,000 | S-C | 10,000 | Tube & Tank | H. E. Read | George B. Davies | F. E. Wilkerson | S. F. Jackson |
| Louisiana Oil Ref. Corp. | Gas Center | 10,000 | S | .... | | See Above | See Above | See Above | |
| New Orleans Refining Co. | Norco | 10,000 | T-A | 2,000 | Dubbs | D. Y. Day | R. D. Garnett[4] | R. G. Ingersoll[8] | A. J. Fernandez |
| Mexican Petroleum Corp. | Destrehan | 32,000 | Comp. | .... | | A. R. Martin | F. E. McMahon | E. Neilsen[7] | H. A. Harley |
| Shreveport Prod. & Ref. | Shreveport | 5,200 | T-C | 1,800 | Dubbs Jenkins | D. H. Christman | R. R. Brinkman | | Bradford Hearn |
| Sinclair Refining Co. of La. | Mermaux | 30,000 | T-A | .... | | James W. Evans | F. W. Fraley | | |
| Standard Oil Co. of La. | Baton Rouge | 80,000 | Comp. | 40,000 | Tube & Tank | C. I. Fiero | | | |
| Texas Company, The | Shreveport | 5,800 | T | .... | Cross, Burton | E. L. McLaren | See Texas | See Texas | See Texas |

[8]Guy Oakes, vice president.
[9]J. Fletcher Farrell, N. G. M. Luykx, vice presidents.
[10]C. O. Scholder, C. I. Fiero, J. A. Bechtold, vice presidents.
[11]Plant shut down for remodeling; will resume operations May 1.
[12]George E. Hite, Jr., B. P. Crittenden, C. M. Bennett, vice presidents.
[12]E. Neilson, New York; G. M. Whelan, New Orleans, La.

## LAND

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pan Amer. Petr. & Trans. Co. | Baltimore | 8,000 | A | .... | | W. W. Hulin | See Louisiana | See Louisiana | |
| Prudential Oil Corp. | Baltimore | 6,000 | S-C | 2,000 | Dubbs | | | | |
| Standard Oil Co. of N. J. | Baltimore | 32,000 | Comp. | 43,480 | Burton Tube & Tank | | See New Jersey | See New Jersey | |

## HUSETTS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Beacon Oil Co. | Everett | 18,000 | T-C-A | 16,500 | Carlton-Ellis Tube & Tank | D. L. Ferguson[2] | J. W. Hopkins[3] | A. M. Bruce[4] | W. C. Kendrick |
| Cities Service Ref. Co. | East Braintree | 10,000 | Comp. | 2,000 | Holmes-Manley | D. P. Sturges[7] | J. A. Kelly | T. J. Spellman | C. L. Boyle |
| New England Oil Ref. Co. | Fall River | 35,000 | T-A | .... | | L. B. Foust | H. D. Vander Wyk | H. D. Vander Wyk | Joseph B. Murphy |

[4]R. G. Phelps, New York; A. M. Bruce, New England.
[5]John S. Cordell, vice president and general manager; W. A. Jones, vice president.
[6]And comptroller.
[7]L. M. Bound, general superintendent.

# 1928 Refinery Survey, Covering Personnel of Co

## MISS

| Name and General Offices— | President | Vice President | Secretary | Treasurer |
|---|---|---|---|---|
| Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago | See Indiana | See Indiana | See Indiana | See Indiana |
| Wilhoit Refining Co., Joplin | E. M. Wilhoit | L. L. Marcell | Mrs. Della Wilhoit | Mrs. Della Wil |

*General manager.

## MON

| | | | | |
|---|---|---|---|---|
| Arro Oil & Refining Co., Lewistown | H. H. Schwartz | Ed L. Allen* | Guy R. Enlow | Ed L. Allen |
| California Petroleum Corp., Security Building, Los Angeles, Calif. | See California | See California | See California | See California |
| Hart Refineries, Missoula | C. W. Hart | | E. G. Hart | E. G. Hart |
| Hart Refineries, Missoula | See above | | See above | See above |
| Lewistown Oil & Refining Co., Lewistown | Frank P. Book | C. W. Buntin | Addison E. Holton | Harold L. Wadsworth |
| Reliance Refining Co., Kalispell | William G. Stearns* | | Max Grier | Max Grier |
| Snow Cap Oil Co., Sunburst | Adam J. Eulberg* | Edward F. Eulberg | Benjamin A. Eulberg | |
| Sunburst Oil & Refining Co., Great Falls | L. C. Stevenson | G. C. Stevenson | Claude E. Anderson | |
| [2]Toole County Refining Co., Oilmont | F. E. Peterson | G. R. Nadeau | J. A. Coons* | John Bradford |
| Yale Oil Corp. of South Dakota, Miles City | L. B. Hancock | John Hancock | P. N. Fortin* | L. B. Hancock |

*General manager.
[1]A. E. O'Brien, general manager, Lewistown Oil & Refining Co.

## NEW J

| | | | | |
|---|---|---|---|---|
| Barber Asphalt Co., 1600 Arch Street, Philadelphia, Pa. | A. W. Sewall | C. W. Bayliss[1] | E. R. Riter | Ira Atkinson |
| Crew-Levick Co., 29 North Broad Street, Philadelphia | See Pennsylvania | See Pennsylvania | See Pennsylvania | See Pennsylvania |
| Gulf Refining Co., Frick Annex Building, Pittsburgh, Pa. | See Texas | See Texas | See Texas | See Texas |
| Standard Oil Co. of New Jersey, 26 Broadway, New York City | Charles G. Black[5] | George W. McKnight | Charles T. White | R. P. Resor |
| Standard Oil Co. of New Jersey, 26 Broadway, New York City | See above | See above | See above | See above |
| Standard Oil Co. of New Jersey, 26 Broadway, New York City | See above | See above | See above | See above |
| Tide Water Oil Co., 11 Broadway, New York, N. Y. | Axtell J. Byles | Robert McKelvy[5] | F. I. Fallon | F. A. Marsellus |
| Vacuum Oil Co., 61 Broadway, New York, N. Y. | See New York | See New York | See New York | See New York |
| Warner-Quinlan Co., 2 Park Avenue, New York, N. Y. | W. W. McFarland | M. Frankel* | George Frankel | George Frankel |

*General manager.
[1]Frank Seamans, vice president.
[2]Bertrin Petroleum Co. has a 2,500-bbl. (Cross) cracking plant at Maurer.
[3]Purchases made under supervision of plant managers.
[4]J. H. Weller, manager Maurer plant.
[5]Edward L. Shea, vice president.

## NEW M

| | | | | |
|---|---|---|---|---|
| Continental Oil Co., 1755 Glenarm Street, Denver, Colo. | See Colorado | See Colorado | See Colorado | See Colorado |
| Continental Oil Co., 1755 Glenarm Street, Denver, Colo. | See Colorado | See Colorado | See Colorado | See Colorado |
| Gilliland Oil Co. of New Mexico, Tuloma Building, Tulsa, Okla. | Fred Phillips | J. H. Riedemann* | D. W. Johnson | D. W. Johnson |
| Gilliland Oil Co. of New Mexico, Tuloma Building, Tulsa, Okla. | See above | See above | See above | See above |

*General manager.

## NEW

| | | | | |
|---|---|---|---|---|
| Sinclair Refining Co., 45 Nassua Street, New York, N. Y. | See Indiana | See Indiana | See Indiana | See Indiana |
| Standard Oil Co. of New York, 26 Broadway, New York | Herbert L. Pratt | C. F. Meyer[1] | H. A. Wilkinson | Richard P. Tim |
| Standard Oil Co. of New York, 26 Broadway, New York | See Above | | | |
| Vacuum Oil Co., 61 Broadway, New York, N. Y. | George P. Whaley | C. E. Bedford[2] | G. V. Holton | Herbert Baker |

[1]H. E. Cole, C. M. Higgins, E. R. Brown, John Barneson, P. S. Fales, vice presidents, Standard Oil Co. of New York.
[2]W. M. McGee, Charles E. Arnott, vice presidents.

## OH

| | | | | |
|---|---|---|---|---|
| Canfield Oil Co., The, 3216 East Fifty-fifth Street, Cleveland | Louis Carruth | Charles McLean | H. M. Carruth | J. A. Jackson |
| Craig Oil Co., The, Weaver and Gleason Streets, Toledo | Pressly T. Craig | J. F. Minke* | George L. Craig | J. H. Bender |
| National Refining Co., National Building, Cleveland | F. B. Fretter | W. H. Lamprecht[1] | J. D. Sadler | H. F. Heil |
| National Refining Co., National Building, Cleveland | See above | See above | See above | See above |
| Paragon Refining Co., 2935 Front Street, Toledo | E. W. Edwards | Howard W. Edwards | C. J. Leroux | C. J. Leroux |
| Pure Oil Co., Pure Oil Building, Chicago, Ill. | See Oklahoma | See Oklahoma | See Oklahoma | See Oklahoma |
| Rajah Oil & Refining Co., Youngstown | B. J. Simms* | | Ray C. Miller | Ray C. Miller |
| Solar Refining Co., Lima | F. T. Cuthbert* | J. R. Cuthbert | H. A. Graham | H. A. Graham |
| Standard Oil Co. of Ohio, East Ohio Gas Building, Cleveland | A. P. Coombe | W. H. Foster[2] | M. G. Vilas | M. G. Vilas |
| Standard Oil Co. of Ohio, East Ohio Gas Building, Cleveland | See Above | | | |
| Stellar Refining Co., Newark | William G. Leamon | J. W. Leonard | D. R. Buchanan | D. R. Buchanan |
| Sun Oil Co., Finance Building, Philadelphia, Pa. | See Pennsylvania | See Pennsylvania | See Pennsylvania | See Pennsylvania |
| Superoil Co., Toledo | F. S. Jerome | E. W. Jackson* | C. L. Hopkins | C. L. Hopkins |

*General manager.
[1]Charles S. Smith, H. F. Heil, vice presidents.
[2]General superintendent.
[3]General sales manager.

## OKLA

| | | | | |
|---|---|---|---|---|
| Anderson-Prichard Oil Corp., Colcord Building, Oklahoma City | L. H. Prichard | J. Steve Anderson | P. H. Anderson | P. H. Anderson |
| Barnsdall Refineries, Inc., Petroleum Building, Tulsa | E. B. Reeser | E. O. Bartlett[1] | J. A. Dunn | E. O. Bartlett |
| Barnsdall Refineries, Inc., Petroleum Building, Tulsa | See Above | See Above | See Above | See Above |
| Bell Oil & Gas Co., Kennedy Building, Tulsa | S. L. Lubell | Albert Finston[2] | R. C. McCoy, Jr. | S. C. Lamport |
| Bolene Refining Co., Enid | T. T. Eason* | T. L. Wade | J. D. Montgomery | J. D. Montgome |
| Champlin Refining Co., Enid | H. H. Champlin* | F. C. Champlin | D. W. Cotton | D. W. Cotton |
| Continental Oil Co., 1755 Glenarm Street, Denver, Colo. | See Colorado | See Colorado | See Colorado | See Colorado |
| Cushing Refining & Gasoline Co., Cushing | E. C. Mullendore | E. J. Blank | Rex H. Winget* | R. C. Jones |
| Cushing Refining & Gasoline Co., Cushing | See Above | See Above | See Above | See Above |
| Empire Oil & Refining Co., Tulsa Trust Building, Tulsa | H. L. Doherty | H. R. Straight[3] | C. E. Murray | D. W. Harris |
| Empire Oil & Refining Co., Tulsa Trust Building, Tulsa | See Above | See Above | See Above | See Above |
| Empire Oil & Refining Co., Tulsa Trust Building, Tulsa | See Above | See Above | See Above | See Above |
| Garber Refinery, Inc., Garber | G. J. Taft | C. A. Ring | Roy R. Ayers[5] | Roy R. Ayers |
| Globe Oil & Refining Co., Blackwell | I. A. O'Shaughnessy* | F. L. Jehle | R. E. Everitt | E. A. Lentz |
| Illinois Oil Co., Rock Island, Ill. | F. P. Welch* | J. W. Armstrong[4] | F. R. Edwards | F. R. Edwards |
| Independent Oil & Gas Co., Kennedy Building, Tulsa | E. H. Moore | R. B. Pringle[5] | R. W. Riggins | R. W. Riggins |
| Johnson Oil Refining Co., 508 South LaSalle Street, Chicago | Homer H. Johnson | L. Ralph Johnson | I. H. Johnson | I. H. Johnson |
| Marland Refining Co., Ponca City | E. W. Marland | S. C. Collins[6] | Charles E. Stephenson | Robert E. Clark |
| Mid-Continent Petroleum Corp., Cosden Building, Tulsa | Jacob France* | George O. Moody[7] | E. M. Rouzer | Charles Klein |

# mpanies and Plants Operating in the United States

## OURI

| Name of Company | Plant Loc. | Crude Capacity | Type Plant | Cracking Capacity | Type Cracqing Unit | Plant Superintendent | Sales Managers: Tank Car | Sales Managers: Bulk and Service Station | Purchasing Agent |
|---|---|---|---|---|---|---|---|---|---|
| Standard Oil Co. of Indiana | Sugar Creek | 12,000 | L-W-A | 10,000 | Burton Holmes-Manley | G. H. Moffett | See Indiana | See Indiana | |
| Wilhoit Refining Co. | Joplin | 1,500 | S-C | 1,000 | Jenkins | C. S. Banks* | E. F. Painter | E. F. Painter | C. S. Banks |

## TANA

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Arro Oil & Refining Co. | Lewistown | 2,000 | S-C | 500 | Dubbs | Paul Jones | Ed L. Allen | | |
| California Petroleum Corp. | Sunburst | 5,000 | T | .... | | D. D. Gibson | See California | See California | |
| Hart Refineries | Missoula | 300 | S | .... | | Harry McCann | | | |
| Hart Refineries | Hedgesville | 100 | S | .... | | G. A. Sarbo | | | |
| Lewistown Oil & Refining Co. | Lewistown | 2,100 | S | .... | | B. J. Manley[1] | | | |
| Reliance Refining Co. | Kalispell | 1,000 | S | .... | | | | ([2]) | |
| Snow Cap Oil Co. | Sunburst | 700 | S | .... | | Benjamin A. Eulberg | | | Adam J. Eulberg |
| Sunburst Oil & Refg. Co. | Great Falls | 3,000 | S | | | Claude E. Anderson | B. G. Stevenson | | C. E. Anderson |
| Toole County Refining Co. | Oilmont | 300 | S | .... | | | | J. A. Coons | J. A. Coons |
| Yale Oil Corp of S. Dak. | Miles City | 800 | T | .... | | A. A. Whittier | P. N. Fortin | P. N. Fortin | P. N. Fortin |

[1]Successors to Absher Refineries, Inc., Kevin, Mont.

[2]General manager in charge of sales.

## ERSEY

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Barber Asphalt Co. | Maurer | 5,000 | A | 2,500 | Cross[2] | H. J. Fleischer[4] | H. C. Hottel | H. C. Hottel | ([2]) |
| Crew-Levick Co. | Petty Island | 5,000 | S-C | 1,300 | Doherty | E. M. Keely | See Pennsylvania | See Pennsylvania | See Pennsylvania |
| Gulf Refining Co. | Bayonne | 25,000 | S | .... | | S. K. Hawxhurst | | | |
| Standard Oil Co. of N. J. | Bayonne | 88,000 | Comp. | 36,000 | Tube & Tank | | | | |
| Standard Oil Co. of N. J. | Jersey City | 17,000 | L | .... | Burton | | | | |
| Standard Oil Co. of N. J. | Linden | 75,000 | Comp. | 87,900 | Tube & Tank | | | | |
| Tide Water Oil Co. | Bayonne | 50,000 | T-L-C | 7,000 | Tube & Tank | R. D. Rogers[5] | Edward L. Shea[7] | | C. H. Bickell |
| Vacuum Oil Co. | Paulsboro | 13,000 | Comp. | 11,500 | Tube & Tank Cross | See New York | See New York | See New York | See New York |
| Warner-Quinlan Co. | Warners | 6,000 | T-C-A | 1,500 | Dubbs | T. K. Giles | B. Frankel | B. Frankel | S. Secular |

[4]General superintendent.

[5]General sales manager.

[2]F. Frankel, Louis Ravicz, vice presidents.

[7]The Standard Oil Development Co. of Delaware has charge of the engineering and chemical development work of the Standard of New Jersey companies. E. M. Clark is president of the company. F. A. Howard, C. H. Haupt and C. A. Straw are vice presidents. Main offices are located at 26 Broadway, New York.

## EXICO

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Continental Oil Co. | Artesia | 1,500 | S | .... | | E. R. Hively | See Colorado | See Colorado | See Colorado |
| Continental Oil Co. | Farmington | 750 | S | .... | | H. H. Kinnaird | See Colorado | See Colorado | See Colorado |
| Gilliland Oil Co. of N. Mex. | Albuquerque | 750 | S | .... | | | | J. H. Riedemann | J. V. Ryan |
| Gilliland Oil Co. of N. Mex. | Roswell | 350 | S | .... | | | | See above | See above |

## YORK

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sinclair Refining Co. | Wellsville | 1,000 | S&L | .... | | See Indiana | See Indiana | | |
| Standard Oil Co. of N. Y. | Brooklyn | 24,000 | Comp. | 8,000 | | | | H. A. Wilkinson | B. B. Jennings |
| Standard Oil Co. of N. Y. | Buffalo | 3,500 | S-L-C | 2,000 | | | | | |
| Vacuum Oil Co. | Olean | 7,000 | Comp. | 4,000 | Tube & Tank Cross | ([3]) | ([4]) | ([4]) | J. R. Taylor |

[3]C. W. Hadley, chairman manufacturing committee and general superintendent of refineries.

[4]C. T. Whitehead, head of sales department.

## IO

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Canfield Oil Co., The | Cleveland | 1,200 | L-W | .... | | | | | M. C. Dippel |
| Craig Oil Co., The | Toledo | 1,500 | Comp. | .... | | | J. H. Van Dershings | J. H. Van Dershings | J. F. Minke |
| National Refining Co. | Findlay | 1,500 | Comp. | .... | | A. J. Rogers | H. Kuegler | C. S. Smith | S. A. White |
| National Refining Co. | Marietta | 500 | L-W | .... | | Fred Bergen | See above | See above | See above |
| Paragon Refining Co. | Toledo | 8,000 | S-L-W | 2,500 | Dubbs | C. W. Luton[2] | John Edwards[2] | | E. H. Shepherd |
| Pure Oil Co. | Newark | 5,000 | S-C | 6,000 | Cross | R. D. McClaran | See Oklahoma | See Oklahoma | See Oklahoma |
| Rajah Oil & Refining Co. | Youngstown | 500 | S-T-L | .... | | J. C. Kuebler | B. J. Simms | Geo. Decker | B. J. Simms |
| Solar Refining Co. | Lima | 10,000 | Comp. | 5,500 | Cross Burton | J. M. Cory | F. L. McGrath | | F. W. Engle |
| Standard Oil Co. of Ohio | Cleveland | 8,000 | Comp. | 8,000 | Burton | C. C. Hogen | A. J. Mills | A. J. Mills | |
| Standard Oil Co. of Ohio | Toledo | 10,000 | L&W | 8,000 | Burton | G. W. Hannikin | | | |
| Stellar Refining Co. | Newark | 1,000 | T-C | 650 | Leamon | H. E. Titus | W. V. Buchanan* | W. V. Buchanan | W. V. Buchanan |
| Sun Oil Co. | Toledo | 5,500 | Comp. | .... | | | | | |
| Superoil Co. | Toledo | 250 | L | .... | | J. J. Curran | ([5]) | | T. E. Keen |

[5]E. L. Hughes, vice president in charge of sales.

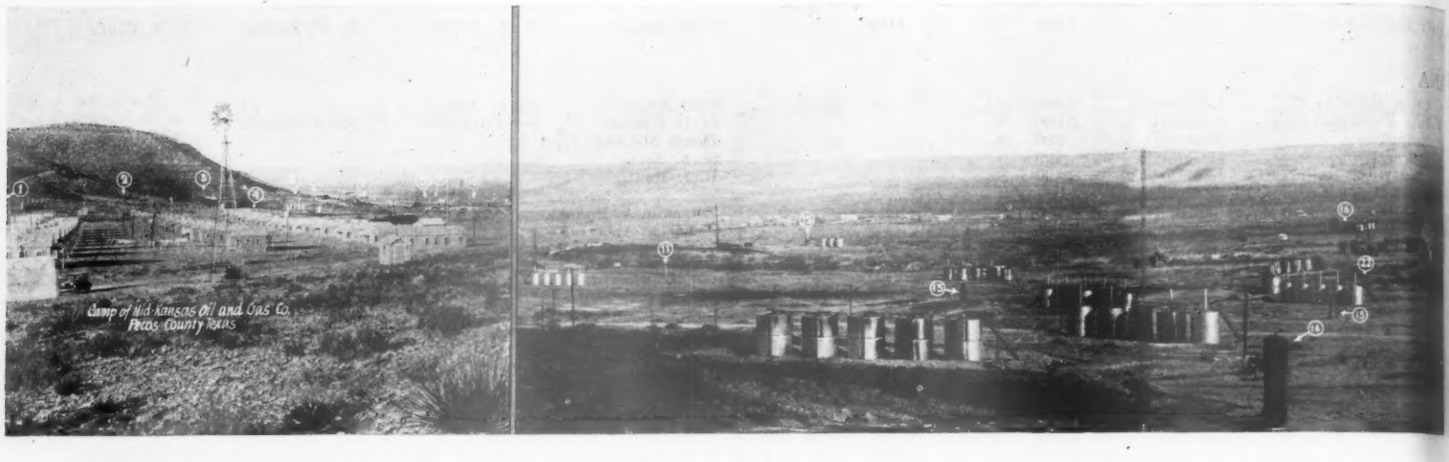
[2]Mideo Refining Co.

*B. A. Mathews, vice president, Standard Oil Co. of Ohio.

## HOMA

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Anderson-Prichard Oil Corp. | Cyril | 3,500 | S | .... | | P. I. Tinkler | C. H. Dresser | | H. G. Donnell |
| Barnsdall Refineries, Inc. | Barnsdall | 6,000 | Comp. | 4,000 | Cross | V. R. Oakley | H. L. Hughes | M. G. Eitelman* | C. E. Good |
| Barnsdall Refineries, Inc. | Okmulgee | 10,000 | S-C | 5,000 | Cross | G. T. Granger | See Above | See Above | |
| Bell Oil & Gas Co. | Grandfield | 4,500 | S-C | 1,000 | Dubbs | | Albert Finston | | J. E. Caddieux |
| Bolene Refining Co. | Enid | 5,000 | S-C | 2,000 | Jenkins | L. C. Florence | R. H. Rowland | J. D. Montgomery | |
| Champlin Refining Co. | Enid | 16,000 | Comp. | 4,000 | Cross | P. E. Slater | L. A. Snyder | A. H. Holland | |
| Continental Oil Co. | Sapulpa | 10,000 | S-C | 3,600 | Cross | M. S. Beringer | See Colorado | See Colorado | See Colorado |
| Cushing Ref. & Gaso. Co. | Cushing | 2,500 | S | .... | | F. A. Davis | E. O. Derrick | | Rex H. Winget |
| Cushing Ref. & Gaso. Co. | Blackwell | 1,500 | S | .... | | J. H. Hutchinson | | | |
| Empire Oil & Refining Co. | Cushing | 5,000 | S-C | 1,500 | Doherty | Curtis Bailey | O. J. Tuttle | W. H. Merritt | G. A. Tompson |
| Empire Oil & Refining Co. | Okmulgee | 3,000 | Comp. | 1,500 | Doherty Dubbs | Don V. Eells | See Above | See Above | See Above |
| Empire Oil & Refining Co. | Ponca City | 7,500 | Comp. | 4,500 | Doherty Dubbs | R. R. Mills | See Above | See Above | See Above |
| Garber Refinery, Inc. | Garber | 4,000 | S-C | 1,200 | Jenkins | H. L. Welton | ([11]) | | H. L. Welton |
| Globe Oil & Refining Co. | Blackwell | 7,500 | S-C | 1,000 | Cross | O. D. Gurley | A. E. Landsittel | | F. L. Jehle |
| Illinois Oil Co. | Cushing | 3,000 | S | .... | | W. W. Kelly | | J. C. Reedy | G. L. Walker |
| Independent Oil & Gas Co. | Okmulgee | 5,000 | Comp. | 1,500 | Jenkins | J. M. Wadsworth[15] | J. V. McCormick | | R. R. Barlow |
| Johnson Oil Refining Co. | Cleveland | 6,000 | S-C | 4,000 | Dubbs | W. L. Leenhauts | G. B. Williams | G. B. Williams | |
| Marland Refining Co. | Ponca City | 27,000 | S-L-W | 18,000 | Dubbs Cross Fleming | Wayne P. Rice | F. D. Applegate | W. I. Nunn | W. H. O'Connor |
| Mid-Continent Pet. Corp. | Tulsa | 40,000 | Comp. | 12,000 | Own | Fred B. Koontz | D. W. Moffitt | D. W. Moffitt | George C. Pohler |

"If it's worth drilling for it's worth saving"



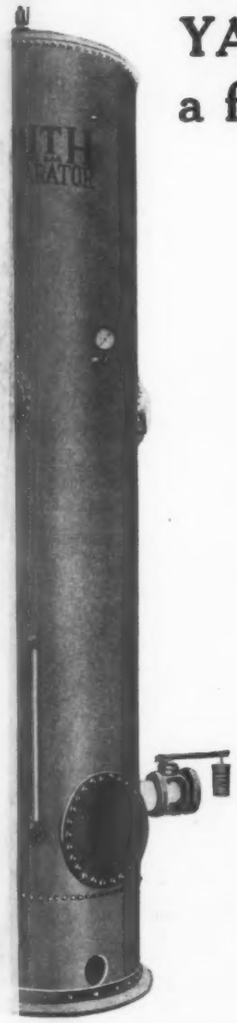

PANORAMIC SECTIONAL VIEW OF FAMOUS
Showing 28 Smith Separators - - - This is only

# Pictures speak

There's a Type for Every
Service, a size for Every
Production Need

"If it's worth drilling for it's worth saving"

"If it's worth drilling for it's worth saving"



YATES POOL, PECOS COUNTY, WEST TEXAS
a few of the Smith Separators in this field

louder than words

SMITH SEPARATOR
COMPANY

Tulsa, Okla.

CALIFORNIA OFFICE:
2039 East 38th St.,
Los Angeles, Calif.

LOUISIANA OFFICE:
737 Rutherford St.
Shreveport, La.

NEW YORK OFFICE:
*Export Representative:*
Oil Field Equipment Co.,
30 Church St.
*Cable Address:*
"Oilfields,"
New York

TEXAS OFFICES:
924 Post Dispatch Bldg.,
HOUSTON, TEXAS
1402 Fort Worth National Bank Bldg.,
FORT WORTH, TEXAS

LONDON OFFICE:
Perkins MacIntosh
Petroleum Tool &
Boring Co., Ltd.,
25 Bishopsgate
*Cable Address:*
"Oleborers," London

"If it's worth drilling for it's worth saving"

# 1928 Refinery Survey, Covering Personnel of Co

## OKLAHOMA

| Name and General Offices— | President | Vice President | Secretary | Treasurer |
|---|---|---|---|---|
| Miller Bros. 101 Ranch Trust, Ponca City | George L. Miller and Zack T. Miller | | | |
| Oil State Refining Co., Enid | C. L. Richards | D. A. Dean | W. R. Major | W. R. Major |
| Peppers Gasoline Co., Enid | Charles C. Peppers | | H. H. Champlin | |
| Pierce Petroleum Corp., 418 Olive Street, St. Louis, Mo. | E. D. Levy | | S. W. Everett | E. D. Levy |
| Producers Oil Co., Sixth Floor Mid-Continent Building, Tulsa | George W. Snedden* | M. D. Sanford | G. A. McCulley | G. A. McCulley |
| Producers & Refiners Corp., Patterson Building, Denver, Colo. | | John Fertig[4] | A. W. Heinemann | O. O. Holmgren |
| Pure Oil Co., Pure Oil Building, Chicago, Ill. | H. M. Dawes | C. B. Watson[5]* | F. S. Heath | Rawleigh Warner |
| Pure Oil Co., Pure Oil Building, Chicago, Ill. | See Above | See Above | See Above | See Above |
| Riley Petroleum Co., 1021 Kennedy Building, Tulsa | Partnership J. L. Riley and Harry Bell | | | |
| Rock Island Refining Co., Duncan | C. H. Verschoyle | L. B. Simmons* | F. G. Hull | F. G. Hull |
| Shaffer Oil & Refining Co., 424 South Cheyenne Avenue, Tulsa | J. J. O'Brien | John L. Gray[10] | W. R. Francisco | W. R. Francisco |
| Sinclair Refining Co., 45 Nassau, New York | See Indiana | | | |
| Sun Oil Co., Finance Building, Pittsburgh, Pa. | See Pennsylvania | See Pennsylvania | See Pennsylvania | See Pennsylvania |
| Texas Company, The, Houston, Tex. | See Texas | See Texas | See Texas | See Texas |
| Tidal Refining Co., Tidal Building, Tulsa | J. N. Robinson | A. F. Garrett[11] | D. W. Bell | D. W. Bell |
| Tonkawa Petroleum Co., Tonkawa | Jules Constantin | M. Constantin | O. Boure | O. Boure |
| Transcontinental Oil Co., Ritz Building, Tulsa | F. B. Parriott | J. C. Adams[12] | E. D. Robinson | E. D. Robinson |
| Transcontinental Oil Co., Ritz Building, Tulsa | See Above | See Above | See Above | See Above |
| Western Oil Corp., Mid-Continent Building, Tulsa | J. F. Darby | George W. Snedden | C. F. Lynde | C. F. Lynde |
| White Oak Refining Co., 617 World Building, Tulsa | W. M. Welch | | F. L. Martin | F. L. Martin |
| Wirt Franklin Petroleum Co., Ardmore | Wirt Franklin | Walter Gant[13] | Edward Galt | P. C. Dings |
| Yale Oil Corp., Yale | L. B. Hancock | C. H. Gifford | F. B. Hancock* | F. B. Hancock |

[1]M. G. Eitelman, George D. Locke, vice presidents.
[2]Mark Finston, vice president and general manager.
[3]F. R. Coates, H. D. Freuauff, F. C. Brown, vice presidents. P. M. Miskill, general manager.
[4]J. G. Huntoon, vice president.
[5]R. Otis McClintock, J. Donald Duncan, vice presidents.
[6]Walter Miller, vice president and general manager; G. G. Shallenberger, H. C. Milroy, vice presidents.
[7]J. C. Denton, D. W. Moffitt, vice presidents.
[8]L. R. Crawford, R. E. Wertz, vice presidents.
[9]N. H. Weber, L. S. Wescoat, R. W. McIlvain, H. N. Cole, G. C. Scott, Rawleigh Warner, F. S. Heath, vice presidents.

## PENNSY

| | | | | |
|---|---|---|---|---|
| American Oil Works Co., Titusville | John A. Beck | W. K. Glenn[1] | A. B. Weingard* | A. B. Weingard |
| Atlantic Refining Co., 260 South Broad Street, Philadelphia | W. M. Irish | W. P. Cutler[2] | W. M. O'Connor | Albert Hill |
| Atlantic Refining Co., 260 South Broad Street, Philadelphia | See Above | See Above | See Above | See Above |
| Atlantic Refining Co., 260 South Broad Street, Philadelphia | See Above | See Above | See Above | See Above |
| Bradford Oil Refining Co., Bradford | J. H. Rose | F. D. Korner | L. E. Mallory | L. E. Mallory |
| Butler County Oil Refining Co., Butler | Lewis P. Litzinger | E. M. Litzinger[7] | C. R. Halleran | E. M. Litzinger |
| Canfield Oil Co., 3216 East Fifty-fifth Street, Cleveland, Ohio | See Ohio | See Ohio | See Ohio | See Ohio |
| Carnegie Refining Co., Carnegie | H. A. Logan | F. G. Bannerot | W. C. Heasley | F. G. Bannerot |
| Conewango Refining Co., Warren | Fred G. Clark | Harry R. Lewis* | F. D. Davis | Harry R. Lewis |
| Continental Refining Co., Oil City | A. F. Anderton* | M. A. De Arman | J. W. Anderton | T. A. Anderton |
| Crew-Levick Co., 219 North Broad Street, Philadelphia | Henry L. Doherty | Harry D.Frueauff[8] | Walter W. Martin | Edward J. Hasse |
| Crystal Oil Works, Oil City | Partnership J. A. Fawcett and E. V. Selden | | | |
| Daugherty, W. H., & Son Refining Co., 114 Fifth Avenue, New York, N. Y. | Dr. F. Sonneborn | J. F. Rolen[9] | R. G. Sonneborn | Max Pick |
| Emery Manufacturing Co., Bradford | E. C. Emery | Lewis Emery* | W. A. McCafferty | Lewis Emery |
| Emlenton Refining Co., Emlenton | P. J. Bayer | H. J. Crawford | T. B. Gregory | S. Messer |
| Empire Oil Works, Inc., Oil City | A. L. Confer | Fred Fair[12] | A. W. Scott | A. W. Scott |
| Freedom Oil Works Co., Freedom | Percy L. Craig | A. J. Minke[12] | C. E. McKee | C. E. McKee |
| Freedom Oil Works Co., Freedom | See Above | See Above | See Above | See Above |
| Gulf Refining Co., Frick Annex Building, Pittsburgh | See Texas | See Texas | See Texas | See Texas |
| Island Petroleum Co., Baltimore, Md. | W. H. Fehsenfeld | V. B. Ward | L. K. High | L. K. High |
| Independent Refining Co., Oil City | Samuel Messer | H. J. Crawford | P. S. Tarbox* | E. P. Theobold |
| Kendall Refining Co., Bradford | Otto Koch | J. H. Bovaird[10] | H. H. Greene | I. H. Shearer |
| McKean County Refining Co., Farmers Valley | F. F. Moore* | C. S. Knabb | Earl Petty | Virginia F. Hubbard |
| Miller, A. D., Sons Co., Columbus and Preble Avenue, Pittsburgh | R. B. Miller | J. B. Miller* | O. B. Opsion | O. B. Opsion |
| Mutual Refining Co., Warren | W. F. Bennett | F. C. Eaton | A. W. Eaton | Herbert G. Eaton* |
| Oil Creek Refining Co., Titusville | D. W. McGraw | J. E. Fleming* | M. D. Woods | G. F. Fleming |
| Pennsylvania Oil Products Co., Warren | M. F. Cowden | George E. Muir | H. E. Lawrence | D. F. Cowden |
| Pennsylvania Refining Co., Karns City | John A. Beck | Wayne K. Glenn | Paul R. Beck | Paul R. Beck |
| Pennzoil Co., Oil City | C. L. Suhr* | Louis Walz[19] | D. J. Cavanaugh | M. A. Brewster |
| Pure Oil Co., Pure Building, Chicago, Ill. | See Oklahoma | See Oklahoma | See Oklahoma | See Oklahoma |
| Seneca Oil Works, Warren | George P. Brockway* | E. W. Parshall | M. C. Parshall | E. C. Gardner |
| Smith, Levi Refining Co., Clarendon | E. H. Beshlin | H. G. Eaton | C. D. Blair | C. D. Blair |
| Starlight Refining Co., Karns City | W. J. Anderson | C. E. Pickard | W. J. Anderson* | C. E. Pickard |
| Sun Oil Co., Finance Building, Philadelphia | J. Howard Pew | J. N. Pew[20] | Frank Cross | Frank Cross |
| Superior Oil Works, Warren | Frank Morrison | F. C. Eaton | Fred B. Jackson | Herbert G. Eaton* |
| Texas Company, The, Houston, Tex. | See Texas | See Texas | See Texas | See Texas |
| Tidioute Refining Co., Tidioute | A. V. Clinger | T. C. Hawkey | F. E. Kopp | C. E. Carnahan |
| Tiona Refining Co., 1130 Widener Building, Philadelphia | E. M. Lyons | C. A. Boler | William A. Powell | William A. Powell |
| Titusville Oil Works, Titusville | F. von Tacky | F. B. von Tacky* | C. L. von Tacky | F. B. von Tacky |
| United Refining Co., Warren | F. G. Bannerot | H. A. Logan* | H. W. Schmidt | H. A. Logan |
| Valvoline Oil Co., 165 Broadway, New York City | W. Dixon Ellis | Henry W. Nichols | C. C. Gou'd | C. C. Gould |
| Valvoline Oil Co., 165 Broadway, New York City | See Above | | | |
| Viking Oil Corp., Clarendon | F. J. McCoy | L. C. Jamieson* | R. W. Clark | F. J. McCoy |
| Waverly Oil Works Co., Fifty-fourth Street, Pittsburgh | Thomas J. Hilliard | H. R. Hilliard[22] | C. Dudley Armstrong | H. R. Hilliard |
| Waverly Oil Works Co., Fifty-fourth Street, Pittsburgh | See Above | See Above | See Above | See Above |

*General manager.
[1]Dr. H. A. Downs, vice president.
[2]In charge of sales department.
[3]R. L. Leonard, W. D. Anderson, Albert Hill, Edwin R. Cox, vice presidents.
[4]Manager of refineries.
[5]Sales manager, domestic.
[6]Sales manager, export.
[7]P. F. Conerty, vice president and general manager.
[8]Charles E. Foster, vice president and general manager; Andrew McBurney, vice president.
[9]S. B. Sonneborn, vice president.
[10]T. M. Murphy, general manager.

## RHODE

| | | | | |
|---|---|---|---|---|
| Standard Oil Co. of New York, 26 Broadway, New York City | See New York | See New York | | |
| Texas Company, The, Houston, Tex. | See Texas | See Texas | See Texas | See Texas |

## SOUTH C

| | | | | |
|---|---|---|---|---|
| Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y. | See New Jersey | See New Jersey | See New Jersey | See New Jersey |

# mpanies and Plants Operating in the United States

(Continued)

| Name of Company | Plant Loc. | Crude Capacity | Type Plant | Cracking Capacity | Type Cracqing Unit | Plant Superintendent | Sales Managers: Tank Car | Sales Managers: Bu'k and Service Station | Purchasing Agent |
|---|---|---|---|---|---|---|---|---|---|
| Miller Bros. 101 Ranch Trust | Ponca City | 100 | S | 100 | | T. B. Overton | | | George W. Miller, Jr.* |
| Oil State Refining Co. | Allen | 800 | S | .... | | R. L. Johnson | W. R. Major | | D. A. Dean |
| Peppers Gasoline Co. | Covington | 1,000 | S | .... | | O. C. Sullivan | | | |
| Pierce Petroleum Corp. | Sand Springs | 8,000 | W-C | 4,000 | Cross | C. R. McKay[16] | J. R. Arrington | R. J. Ahsens | W. L. Weiss |
| Producers Oil Co. | Bristow | 1,500 | S | .... | | C. H. Fox | I. H. Patton | | M. D. Sanford |
| Producers & Refiners Corp. | Tulsa | 6,000 | S-C | 3,000 | Dubbs | John Cutter | H. E. Johnston | | A. C. Tillman |
| Pure Oil Co. | Muskogee | 9,000 | Comp. | 4,000 | Cross | G. A. McBride | R. H. McElroy | L. S. Wescoat | G. L. Parsons |
| Pure Oil Co. | Ardmore | 2,000 | S-C | 2,000 | Dubbs | J. Jeffrey | See Above | See Above | See Above |
| Riley Petroleum Co. | Bristow | 1,000 | S | .... | | | | | |
| Rock Island Refining Co. | Beckett | 2,500 | S | .... | | S. E. Davis | C. C. Calvert | C. C. Calvert | F. G. Hull |
| Shaffer Oil & Refining Co. | Cushing | 10,000 | T-L-C | 3,800 | Dubbs | W. E. Moody | B. L. Majewski | B. L. Majewski | Robert G. Martin |
| Sinclair Refining Co. | Muskogee | 1,600 | S | .... | | | | See Indiana | |
| Sun Oil Co. | Yale | 5,000 | S | .... | | | See Pennsylvania | See Pennsylvania | See Pennsylvania |
| | | | | 3,000 | Burton | | | | |
| Texas Company, The | Tulsa | 10,000 | Comp | 13,600 | Holmes-Manley | P. L. Drake | See Texas | See Texas | See Texas |
| Tidal Refining Co. | Drumright | 10,000 | T-C | 3,000 | Tube & Tank | R. S. Stanfield | R. N. Cline | | J. B. Johnson |
| Tonkawa Petroleum Co. | Tonkawa | 2,500 | S | .... | | | | | |
| Transcontinental Oil Co. | Bristow | 5,000 | S-C | 1,350 | Slagter | William M. Fraser | H. J. Scott | H. J. Scott | W. R. Brown |
| Transcontinental Oil Co. | Boynton | 2,500 | Comp. | 900 | Slagter | J. R. Barrott | See Above | See Above | See Above |
| Western Oil Corp. | Beckett | 2,000 | S | .... | | J. R. Travis | I. H. Patton | | |
| White Oak Refining Co. | Allen | 2,000 | T | .... | | R. L. Walde | F. L. Martin[17] | | |
| Wirt Franklin Petroleum Co. | Ardmore | 4,000 | S | .... | | A. M. Edmiston | C. W. Scott | W. H. Gilreath | |
| Yale Oil Corp. | Yale | 1,500 | S | .... | | Willard Shaw | F. B. Hancock | | |

[10]F. C. Gordon, R. J. Fraf, L. B. Riddle, B. L. Majewski, W. E. Moody, E. J. McKay, vice presidents.
[11]W. C. Franklin, vice president.
[12]W. M. Bottomfield, J. M. Holliday, L. B. McCammon, vice presidents.
[13]Ossian Cameron, Frank Porter, D. A. Corcoran.
[14]Sales handled by Omar Refining Co., Tulsa.
[15]Manager refinery department.
[16]L. W. Barbour, general manager manufacturing and refineries.
[17]D. A. Corcoran, general sales manager.
*General manager.

## LVANIA

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| American Oil Works Co. | Titusville | 1,500 | Comp | 250 | Fleming | H. Kittner | M. H. Hindman[5] | | |
| Atlantic Refining Co. | Philadelphia | 50,000 | Comp | 32,000 | Lewis Cross | H. M. Nichols[4] | R. D. Leonard[5] | W. D. Anderson[4] | M. F. Roberts |
| Atlantic Refining Co. | Franklin | 8,000 | Comp | 6,000 | Cross | G. E. Glines | See Above | See Above | See Above |
| Atlantic Refining Co. | Pittsburgh | 7,000 | Comp | 4,000 | Cross | G. H. Weaver | See Above | See Above | See Above |
| Bradford Refining Co. | Bradford | 1,200 | L | .... | | W. R. Reck | James Lewis | James Lewis | |
| Butler County Oil Ref. Co. | Bruin | 1,000 | Comp | 1,000 | Bruin | J. C. McCory | P. F. Conerty | C. R. Halleran | |
| Canfield Oil Co. | Coraopolis | 1,000 | L | .... | | | See Ohio | See Ohio | See Ohio |
| Carnegie Refining Co. | Carnegie | 1,000 | L-W | .... | | R. Burr | J. Earl French | J. Earl French | J. Earl French |
| Conewango Refining Co. | Warren | 1,000 | L | .... | | Henry A. Johnson | Harry R. Lewis | | Tom Moore |
| Continental Refining Co. | Oil City | 500 | L-W | .... | | J. B. Haumesser | C. F. Felton | C. F. Felton | T. A. Anderton |
| Crew-Levick Co. | Titusville | 2,000 | L | .... | | C. E. Kinder | A. H. Irelan | W. J. O'Malley | E. D. Erney |
| Crystal Oil Works | Rouseville | 1,000 | L-W | .... | | | (10) | | |
| Daugherty, W. H., Son R. Co. | Petrolia | 1,000 | L | .... | | Alexander Lackman | W. A. McCafferty | H. C. Loveless | H. C. Loveless |
| Emery Manufacturing Co. | Bradford | 2,000 | S-L-W | .... | | M. J. Glynn[11] | | | |
| Emlenton Manufacturing Co. | Emlenton | 1,000 | Comp | 300 | Snodgrass | A. W. Cole | H. F. Krathge | H. F. Krathge | |
| Empire Oil Works, Inc. | Reno | 1,000 | Comp | .... | | Philip Gredel[14] | R. B. McKee | J. G. McCaw | G. J. Mohr |
| Freedom Oil Works Co. | Freedom | 2,000 | L | .... | | H. J. Malloy | See Above | See Above | See Above |
| Freedom Oil Works Co. | Coraopolis | 750 | L-C | 500 | Dubbs | Luther R. Jones | See Texas | See Texas | See Texas |
| Gulf Refining Co. | Philadelphia | 25,000 | S | .... | | Myron Evans[15] | Myron Evans | | |
| Island Petroleum Co. | Neville Island | 1,000 | Comp | 200 | Snodgrass | H. E. Shoemaker | | | C. R. Keniston |
| Independent Refining Co. | Oil City | 1,500 | Comp. | 400 | Bruin | Lon Crawford | I. H. Shearer | J. B. Fisher | J. B. Fisher |
| Kendall Refining Co. | Bradford | 1,500 | Comp | 1,100 | Dubbs | Earl Petty | F. F. Moore | F. F. Moore | Earl Petty |
| McKean County Refining Co. | Farmers Valley | 1,000 | L | .... | | William Clowes | J. B. Miller | O. B. Opsion | J. B. Miller |
| Mil'er, A. D., Sons Co. | Pittsburgh | 1,000 | L | .... | | A. T. Eaton | Herbert G. Eaton | Herbert G. Eaton | Herbert G. Eaton |
| Mutual Refin'ng Co. | Warren | 750 | L-C | 250 | Snodgrass | F. J. McGraw | M. D. Woods | | G. L. Ehrhart |
| Oil Creek Refining Co. | Titusvil'e | 1,000 | Comp | .... | | D. F. Cowden[17] | H. S. Hayden | H. S. Hayden | |
| Pennsylvania Oil Products Co. | Eldred | 1,500 | L-W-C | 1,000 | | Walter W. Beck | Wayne K. Glenn[19] | Charles N. Fry | Wayne K. Glenn |
| Pennsylvania Refining Co. | Karns City | 1,200 | L-W | .... | | L. D. Fulton | D. J. Cavanaugh | R. A. Browne | G. B. Evans |
| Pennzoil Co. | Rouseville | 3,500 | Comp | 3,000 | Fleming Dubbs | E. A. McCadden | See Oklahoma | See Oklahoma | See Oklahoma |
| Pure Oil Co. | Marcus Hook | 10,000 | S-C | 8,000 | Cross | H. S. Peterson | | | |
| Seneca Oil Works | Warren | 800 | L-W-C | 200 | Snodgrass | C. E. Pickard | W. J. Anderson | W. J. Anderson | W. J. Anderson |
| Smith, Levi Refining Co. | Clarendon | 350 | S | .... | | W. D. Mason | S. B. Eckert | S. B. Eckert | W. H. Booth |
| Starlight Ref.ning Co. | Karns City | 150 | L | .... | | H. F. Cogswell | W. F. Jewell | | |
| Sun Oil Co. | Marcus Hook | 35,000 | L-C | 4,000 | Cross | Roy H. Donaldson | See Texas | See Texas | See Texas |
| Superior Oil Works | Warren | 500 | L-W | .... | | H. E. Mi'lard | T. C. Hawkey | T. C. Hawkey | |
| Texas Company, The | Marcus Hook | 2,500 | A | .... | | H. W. Walchli | | | |
| Tidioute Refining Co. | Tidioute | 800 | S | .... | | William Hartz | F. B. von Tacky | E. F. von Tacky | F. B. von Tacky |
| Tiona Refining Co. | Clarendon | 1,000 | L-W | .... | | H. J. Miner[21] | | | |
| Titusville Oil Works | Titusville | 1,000 | L | .... | | H. C. Eaton | H. W. Nuckols | | K. C. Wyckoff |
| United Refining Co. | Warren | 1,500 | Comp | .... | | D. C. Eaton | W. L. Day | | |
| Valvoline Oil Co. | East Butler | 3,000 | | .... | | George H. Seager | L. C. Jamieson | | F. J. McCoy |
| Valvoline Oil Co. | Warren | 1,000 | | .... | | J. T. Malone | L. L. Long | J. B. Fisher | Thomas F. O'Leary |
| Viking Oil Corp. | Clarendon | 1,000 | L-W | .... | | H. A. Trimmer | See Above | See Above | See Above |
| Waverly Oil Works | Pittsburgh | 1,000 | Comp | 1,000 | Cross | | | | |
| Waverly Oil Works | Coraopolis | 3,000 | S-C | 2,500 | Cross | | | | |

[12]G. B. Hunter, general manager.
[13]E. W. Chase, vice president and general manager.
[17]Earl M. Craig, vice president; J. G. McCaw, assistant to vice president.
[18]E. J. Bischoffberger, general manager.
[20]Manager.
[19]H. H. Greene, vice president.
[17]S. P. Stannard, general manager.
[18]Paul R. Beck, sales manager, tank car.
[19]E. C. Breene, vice president.
[20]J. Edgar Pew, vice president.
[21]MacLean Houston, production manager.
[22]D. W. Hovey, vice president.

## ISLAND

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Standard Oil Co. of N. Y. | Providence | 10,000 | SA&C | 10,000 | Cross | | | | |
| Texas Company, The | Providence | 2,500 | A | .... | | Thomas Wall | See Texas | See Texas | See Texas |

## AROLINA

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Standard Oil Co. of N. J. | Charleston | 15,000 | Comp. | 30,680 | | See New Jersey | See New Jersey | See New Jersey | See New Jersey |

# 1928 Refinery Survey, Covering Personnel of Co

| Name and General Offices— | President | Vice President | Secretary | Treasurer |
|---|---|---|---|---|
| Amarillo Producers & Refiners Corp., 219 Amarillo Building, Amarillo | J. D. Wrather* | Dr. J. R. Wrather | W. S. Roberts | John Wrather |
| Amarillo Refining Co., Inc., Amarillo | Reece S. Allen* | C. J. Ferguson | Gordon T. West | Gordon T. West |
| American Refining Co., Wichita Falls | In hands of receivers | | | |
| Bluebonnet Oil Refining Co., Dallas | John T. Withers, Jr. | B. L. Woolley* | | B. L. Woolley |
| Col-Tex Refining Co., Colcord Building, Oklahoma City, Okla. | L. H. Prichard | J. Steve Anderson | P. H. Anderson | P. H. Anderson |
| Continental Oil Co., 1755 Glenarm Street, Denver, Colo. | See Colorado | See Colorado | See Colorado | See Colorado |
| Crown Central Petroleum Corp., Post-Dispatch Building, Houston | W. A. Williams | M. C. Ehlen | R. H. Lindsey | R. H. Lindsey |
| Dale Oil & Refining Co., City National Bank Building, Wichita Falls | J. E. Dale | Jack B. Dale[2] | C. H. Melton | C. H. Melton |
| Deepwater Oil Refineries, Inc., Houston | R. A. Foutts* | F. M. Law[20] | E. L. Neville | E. L. Neville |
| Empire Oil & Refining Co., Tulsa Trust Building, Tulsa, Okla. | See Oklahoma | See Oklahoma | See Oklahoma | See Oklahoma |
| Falls Refining Co., Wichita Falls | H. W. Roberts, Owner and general manager | | | |
| Grayburg Oil Co., Maverick Building, San Antonio | T. L. Thompson* | J. S. Young[25] | E. Palmer | E. Palmer |
| Gulf Refining Co., Frick Annex Building, Pittsburgh | George S. Davison | G. R. Nutty[3] | W. J. Guthrie | J. E. Nelson |
| Gulf Refining Co., Frick Annex Building, Pittsburgh | See Above | See Above | See Above | See Above |
| Humble Oil & Refining Co., Humble Building, Houston | W. S. Farish | R. L. Blaffer[4] | F. O. Freese | R. L. Blaffer |
| Humble Oil & Refining Co., Humble Building, Houston | See Above | See Above | See Above | See Above |
| Humble Oil & Refining Co., Humble Building, Houston | See Above | See Above | See Above | See Above |
| Humble Oil & Refining Co., Humble Building, Houston | See Above | See Above | See Above | See Above |
| Iowa Park Producing & Refining Co., Iowa Park | J. F. Boyd | P. F. Gwynn* | J. D. Overbey | Tom Corridon |
| Kent-Middleton Refining Co., Corsicana | G. C. Kent and C. A. Middleton*, partnership | | | |
| Kent-Middleton Refining Co., Corsicana | See Above | See Above | See Above | See Above |
| Macmillan Refining Co., Amarillo | R. S. Macmillan | H. R. Macmillan | S. M. Batterson | Dewitt Knox |
| Magnolia Petroleum Co., Magnolia Building, Dallas | E. R. Brown | E. E. Plumly[5] | Courtenay Marshall | W. C. Proctor |
| Magnolia Petroleum Co., Magnolia Building, Dallas | See Above | See Above | See Above | See Above |
| Magnolia Petroleum Co., Magnolia Building, Dallas | See Above | See Above | See Above | See Above |
| Magnolia Petroleum Co., Magnolia Building, Dallas | See Above | See Above | See Above | See Above |
| Magnolia Petroleum Co., Magnolia Building, Dallas | See Above | See Above | See Above | See Above |
| Misko Refineries, Inc., Laredo | O. W. Killam* | W. T. Killam | J. O. Garnett | W. T. Killam |
| Noble Oil & Gas Co., Wright Building, Tulsa, Okla. | Thad B. Preston | W. J. Schnur | W. J. Coppinger | W. J. Schnur* |
| Olney Oil & Refining Co., Olney | A copartnership: O. T. Anderson and S. J. Marcell | | | |
| Oriental Oil Co., 1911½ Pacific Avenue, Dallas | W. R. Smith | Frank M. Smith* | D. G. White | Frank M. Smith |
| Oriental Oil Co., 1911½ Pacific Avenue, Dallas | See Above | See Above | See Above | See Above |
| Orient Petroleum Co., Wichita Falls | H. C. Muier | W. F. Davis* | E. G. Guy | J. P. Howe |
| Panhandle Refining Co., Staley Building, Wichita Falls | Roy B. Jones | W. D. Brookover[6] | R. C. Stanford | M. A. Chambers |
| Pasotex Petroleum Co., El Paso[23] | | | | |
| Phillips Petroleum Co., Bartlesville, Okla. | Frank Phillips | L. E. Phillips[7] | O. W. King | O. W. King |
| Pioneer Oil & Refining Co., San Antonio | A. B. Slimp* | M. L. Roark[8] | M. L. Roark | M. L. Roark |
| Primtex Refining Co., Dallas | Herbert D. Brin | S. E. Brin | E. Garonzik | E. Garonzik |
| Pure Oil Co., Pure Oil Building, Chicago, Ill. | See Oklahoma | See Oklahoma | See Oklahoma | See Oklahoma |
| Rio Grande Oil Co., 714 South Hill Street, Los Angeles, Calif. | See California | See California | See California | See California |
| San Angelo Refining Co., San Angelo | W. R. Hassett | R. P. Humes* | R. D. Lavery | R. D. Lavery |
| Simms Oil Co., Magnolia Building, Dallas | Edward T. Moore | F. R. Schneider[10] | L. W. Richards | D. H. Voss |
| Sinclair Refining Co., 45 Nassau Street, New York City | See Indiana | | | |
| Star Refining & Producing Co., Fort Worth | W. M. Harrison* | Herman Gartner | Clara Mabry | Clara Mabry |
| Terminal Oil & Refining Co., Houston | E. G. Goforth* | Mills Bennett | L. D. Minto | L. D. Minto |
| Texas Company, The, Houston | R. C. Holmes | T. J. Donoghue[22] | E. M. Crone | C. E. Woodbridge |
| Texas Company, The, Houston | See Above | See Above | See Above | See Above |
| Texas Company, The, Houston | See Above | See Above | See Above | See Above |
| Texas Pacific Coal & Oil Co., F. & M. Bank Building, Fort Worth | E. J. Marston | O. E. Mitchell[11] | H. W. Knox | P. Seibel |
| Texas Petroleum Products Co., 912 South Medina Street, San Antonio | Grover Shaw* | R. L. Shaw | W. I. Lighthouse | W. I. Lighthouse |
| Tidal Western Oil Corp., Tidal Building, Tulsa, Okla. | J. N. Robinson | W. C. Franklin[12] | D. W. Bell | D. W. Bell |
| Transcontinental Oil Co., Ritz Building, Tulsa, Okla. | See Oklahoma | See Oklahoma | See Oklahoma | See Oklahoma |
| Valley Refining Co., Pyote | Plant under construction | | | |
| Waggoner Refining Co., Inc., Electra | W. T. Waggoner | | R. L. Moore | R. L. Moore |
| White Eagle Oil & Refining Co., Federal Reserve Building, Kansas City, Mo. | See Kansas | See Kansas | See Kansas | See Kansas |

*General manager.
[1]C. M. Johnson, general manager of refineries.
[2]D. G. Gray, vice president and general manager.
[3]George H. Taber, vice president.
[4]F. P. Sterling, James Anderson, H. C. Wiess, W. W. Fondren, J. S. Bonner, vice presidents.
[5]W. H. Frances, B. H. Stephens, F. V. Faulkner, W. C. Proctor, vice presidents.
[6]Thomas Morrissey, vice president.
[7]J. H. Kane, C. H. Alexander, William N. Davis, H. E. Koopman, vice presidents. L. E. Phillips, general manager.
[8]F. E. Rice, general superintendent of refinery and gasoline production.
[9]C. A. Slimp, vice president.
[10]W. L. Todd, vice president.
[11]E. R. Lederer, La Rue Smith, vice presidents.
[12]B. H. Stevens, general manager.

| | | | | |
|---|---|---|---|---|
| Diamond Oil Co., 302 Vermont Building, Salt Lake City | John T. White | J. W. Musser* | Joseph Behling | Joseph Behling |
| Utah Oil Refining Co., Salt Lake City | John C. Howard* | William R. Wallace | A. N. Johnson | A. N. Johnson |

*General Manager.

| | | | | |
|---|---|---|---|---|
| Texas Company, The, Houston, Tex. | See Texas | See Texas | See Texas | See Texas |
| Ohio Valley Refining Co., St. Marys | J. P. Flynn | H. J. Crawford | W. R. Reitz | W. R. Reitz |
| Pure Oil Co., Chicago, Ill. | See Oklahoma | See Oklahoma | See Oklahoma | See Oklahoma |
| Standard Oil Co. of New Jersey, 26 Broadway, New York, N. Y. | See New Jersey | See New Jersey | See New Jersey | See New Jersey |
| Tri-State Refining Co., Kenova | G. C. Davison | | C. P. Caulkins | C. P. Caulkins |

[1]F. R. Payne, general manager.

| | | | | |
|---|---|---|---|---|
| Continental Oil Co., 1755 Glenarm Street, Denver, Colo. | See Colorado | See Colorado | See Colorado | See Colorado |
| Midwest Refining Co., First National Bank Building, Casper* | | | | |
| Midwest Refining Co., First National Bank Building, Casper* | | | | |
| Midwest Refining Co., First National Bank Building, Casper* | | | | |
| Northwestern Petroleum Co., Osage | Edward Stenger | | L. H. Sohn | F. W. Palis |
| Producers & Refiners Corp., Patterson Building, Denver, Colo. | See Oklahoma | See Oklahoma | See Oklahoma | See Oklahoma |
| Texas Company, The, Houston, Tex. | See Texas | See Texas | See Texas | See Texas |
| White Eagle Oil & Refining Co., Kansas City, Mo. | See Kansas | See Kansas | See Kansas | See Kansas |

*General Manager.

*All Midwest plants are leased by the Standard Oil Co. of Indiana, which also

# Companies and Plants Operating in the United States

## TEXAS

| Name of Company | Plant Loc. | Crude Capacity | Type Plant | Cracking Capacity | Type Cracqing Unit | Plant Superintendent | Sales Managers: Tank Car | Sales Managers: Bulk and Service Station | Purchasing Agent |
|---|---|---|---|---|---|---|---|---|---|
| Amarillo Prod. & Ref. Corp. | Borger | 2,000 | S | .... | | John Wrather | P. H. Hertzog | P. H. Hertzog | J. D. Wrather |
| Amarillo Refining Co., Inc. | Amarillo | 6,000 | S-C | 3,000 | Rowsey | G. L. Rowsey | R. G. Cocanower | C. N. Dillon | G. L. Rowsey |
| American Refining Co. | Wichita Falls | 6,000 | S&C | .... | | D. B. Kelley | | | |
| Bluebonnet Oil Co. | Wickett | 5,000 | S-T | .... | | I. B. Chittenden | John T. Withers, Jr. | | |
| Col-Tex Refining Co. | Colorado | 8,500 | S | .... | | George H. Burruss | C. L. Mayhall | C. L. Mayhall | H. G. Donnell |
| Continental Oil Co. | Wichita Falls | 6,000 | S-C | 2,400 | Dubbs | D. H. Hyler | See Colorado | See Colorado | See Colorado |
| Crow Central Pet. Corp. | Houston | 5,000 | L-C | 5,000 | Holmes-Manley | Roger Q. Traweek[1] | J. Stickel | J. Stickel | A. L. Lloyd |
| Dale Oil & Refining Co. | Electra | 2,500 | S | .... | | George A. Jennings | D. G. Gray | D. G. Gray | D. G. Gray |
| Deepwater Oil Refineries, Inc. | Houston | 2,500 | L | .... | | J. P. Gillen | F. L. Rogers | F. L. Rogers | J. P. Gillen |
| Empire Oil & Refining Co. | Gainesville | 5,000 | S-C | 2,800 | Dubbs | E. H. Roy | See Oklahoma | See Oklahoma | See Oklahoma |
| Falls Refining Co. | Wichita Falls | 1,500 | S | .... | | T. P. Cannon | H. W. Roberts | H. W. Roberts | H. W. Roberts |
| Grayburg Oil Co. | San Antonio | 5,000 | T-C | 2,000 | Dubbs | Frank Howell | C. F. Watson | A. S. Mowinckle | |
| Gulf Refining Co. | Fort Worth | 7,000 | S-C | 5,000 | Gulf | Herman Taylor | J. W. Williams | W. V. Hartmann | C. T. March |
| Gulf Refining Co. | Port Arthur | 125,000 | Comp. | 50,000 | Gulf | George L. Prichard | See Above | See Above | See Above |
| Humble Oil & Refining Co. | Baytown | 100,000 | S-L | 95,000 | Tube & Tank Cross | R. E. Powell | B. H. Brown | M. J. Monroe | A. M. Bowman |
| Humble Oil & Refining Co. | McCamey | 12,000 | S | .... | | R. X. Cook | See Above | See Above | See Above |
| Humble Oil & Refining Co. | San Antonio | 4,000 | S | .... | | C. M. Bell | See Above | See Above | See Above |
| Humble Oil & Refining Co. | Ingleside | 12,000 | S | .... | | | See Above | See Above | See Above |
| Iowa Park Prod. & Ref. | Iowa Park | 2,500 | S | .... | | J. W. Beasley | | | J. D. Overbey |
| Kent-Middleton Refining Co. | Angus | 4,000 | S | .... | | Herbert Soape | John C. Calhoun | | |
| Kent-Middleton Refining Co. | Minerva | 2,250 | S | .... | | R. B. Swain | See Above | See Above | See Above |
| Macmillan Refining Co. | Isom | 5,000 | S | .... | | | | | |
| Magnolia Petroleum Co. | Beaumont | 60,000 | S-C | 60,000 | Cross Burton | C. S. Dickens[12] | E. P. Angus | E. P. Angus | E. R. Falner |
| Magnolia Petroleum Co. | Fort Worth | 5,000 | S | .... | | John Ricker | See Above | See Above | See Above |
| Magnolia Petroleum Co. | Corsicana | 5,000 | S | .... | | W. H. Hastings | See Above | See Above | See Above |
| Magnolia Petroleum Co. | Magpetco | 10,000 | S | .... | | W. W. White | See Above | See Above | See Above |
| Magnolia Petroleum Co. | Luling | 2,000 | S | .... | | J. T. Dickens | See Above | See Above | See Above |
| Misko Petroleum Co. | Mirando City | 1,500 | L | .... | | E. A. Johnson | W. T. Killam | | E. A. Johnson |
| Noble Oil & Gas Co. | Burkburnett | 3,500 | S | .... | | J. T. Haning. | S. C. Cameron | | R. B. Martin |
| Olney Oil & Refining Co. | Olney | 2,000 | S | .... | | O. T. Anderson | C. T. Wolverton, Jr.* | | O. T. Anderson |
| Oriental Oil Co. | Oriental | 1,500 | W | .... | | | B. H. Pitman | Arthur P. Dyer | B. H. Pitman |
| Oriental Oil Co. | Oroco Switch | 4,500 | S | .... | | F. M. Floyd | See Above | See Above | See Above |
| Orient Petro'eum Co. | Wichita Falls | 2,500 | S | .... | | E. G. Guy | W. F. Davis | R. L. Taylor | [13] |
| Panhandle Refining Co. | Wichita Falls | 4,000 | S-C | 1,400 | Dubbs | W. F. Simms | G. W. Reed | C. V. Millican | R. J. Mann |
| Pasotex Petroleum Co. | El Paso | 10,000 | S | | | | | | |
| Phillips Petroleum Co. | Borger | 7,500 | S | .... | | M. P. Youker* | H. A. Trower | O. L. Cordell | E. F. Guidinger |
| Pioneer Oil & Refining Co. | Somerset | 1,500 | S-T-L | .... | | H. B. Slimp | A. W. Nunn | A. W. Nunn | H. B. Slimp |
| Primtex Refining Co. | Grand Prairie | 2,500 | S | .... | | | | | |
| Pure Oil Co. | Nederland | 20,000 | S-C | 13,000 | Cross | R. L. Vernor | See Oklahoma | See Oklahoma | See Oklahoma |
| Rio Grande Oil Co. | El Paso | 3,000 | S | .... | | C. F. Witz | See California | See California | See California |
| San Angelo Refining Co. | San Angelo | 2,000 | S | .... | | Charles Vandever | R. P. Humes | R. P. Humes | R. P. Humes |
| Simms Oil Co. | Harrys | 4,200 | S-C | 3,600 | Cross | F. N. Williams | | George D. Bowers | W. J. Morrison |
| Sinclair Refining Co. | Houston | 20,500 | L&C | 20,000 | Isom | | | | |
| Star Refining & Producing Co. | Fort Worth | 1,500 | S-C | 1,500 | Fleming | H. L. Pemberton | W. M. Harrison | W. M. Harrison | W. M. Harrison |
| Terminal Refining Co. | Texas City | 2,500 | T | 2,500 | Jenkins | H. R. Bennett | B. T. McNeil | | H. F. Hoffmaster, Jr. |
| Texas Company, The | Port Arthur | 60,000 | Comp. | 79,200 | Holmes-Manley | F. P. Dodge[22] | [18] | [16] | [19] |
| Texas Company, The | Port Neches | 20,000 | A | .... | | L. F. J. Wilking | See Above | See Above | See Above |
| Texas Company, The | Dallas | 15,000 | Comp. | 2,400 | Holmes-Manley | H. P. Parrigin | See Above | See Above | See Above |
| Texas Pacific C. & O. Co. | Fort Worth | 2,700 | S-L-C | 650 | Cross | C. B. Faught | F. D. Bostaph | F. D. Bostaph | J. C. Davis |
| Texas Petroleum Products Co. | Somerset | 2,000 | S-L | .... | | E. A. Dartois | Grover Shaw | Grover Shaw | |
| Tidal Western Oil Corp. | Burkburnett | 3,000 | T | .... | | L. O. Smith[14] | R. M. Cline | | |
| Transcontinental Oil Co. | Fort Worth | 5,000 | Comp. | 1,350 | Slagter | Wm. R. Sonricker | See Oklahoma | See Oklahoma | See Oklahoma |
| Valley Refining Co. | Pyote | 2,000 | S | .... | | | | | |
| Waggoner Ref. Co., Inc. | Electra | 3,500 | S | .... | | J. C. Hinds | C. F. Kolp[17] | E. J. Gillum | C. F. Kolp* |
| White Eagle Oil & Ref. Co. | Fort Worth | 6,000 | S-C | 1,100 | Holmes-Manley | G. S. Dunham | See Kansas | See Kansas | See Kansas |

[1]A. F. Garrett, vice president and general manager.
[2]L. O. Smith, superintendent.
[3]C. S. Diehl, vice president.
[4]E. G. Guy for refinery; J. G. Oakley for service stations.
[5]H. D. Jenkins, assistant sales manager tank car sales.
[6]Sales managers: Northern territory, H. W. Dodge, New York; southern territory, J. P. Gruet, Houston; export, R. Cullinan; asphalt, W. H. Kershaw; railway sales, W. E. Greenwood.
[10]A. F. Colling, manager purchasing department.
[20]J. P. Gillen, vice president.
[21]D. J. Moran, G. L. Noble, W. W. Bruce, T. Rieber, C. B. Ames, vice presidents.
[23]F. T. Manley, manager refining department.
[25]Pasotex Petroleum Co. is owned by the Standard Oil Co. of California. Plant under construction will start operating about June 1.

## UTAH

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Diamond Oil Co. | Virgin | 500 | T | .... | | B. H. Heitcamp | | | J. W. Musser |
| Utah Oil Refining Co. | Salt Lake City | 4,500 | Comp. | 9,000 | Burton Holmes-Manley | E. S. Holt | M. J. Greenwood | M. J. Greenwood | W. H. Loveay |

## VIRGINIA

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Texas Company, The | Norfolk | 2,500 | A | .... | | C. S. Atwell | See Texas | See Texas | See Texas |

## WYOMING

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Ohio Valley Refining Co. | St. Marys | 1,000 | Comp. | 300 | Batch | J. B. Northrop | A. M. Kiester | H. G. Triplett | J. B. Northrop |
| Pure Oil Co. | Cabin Creek | 3,500 | Comp. | 1,000 | Gyro | J. R. Palmer | See Oklahoma | See Oklahoma | |
| Standard Oil Co. of N. J. | Parkersburg | 4,000 | C-L | 7,924 | Tube & Tank | See New Jersey | See New Jersey | See New Jersey | |
| Tri-State Refining Co. | Kenova | 2,000 | Comp. | 500 | Jenkins | F. G. Brown[1] | W. H. Seltzer | R. E. Hare | M. K. Lovell |

## WYOMING

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Continental Oil Co. | Glenrock | 10,000 | S-C | 3,600 | Burton | K. W. Shimeall | See Colorado | See Colorado | See Colorado |
| Midwest Refining Co. | Casper | 50,000 | Comp. | 30,000 | Burton | M. G. Paulus | | | |
| Midwest Refining Co. | Greybull | 10,000 | S&A | 15,000 | Burton | | | | |
| Midwest Refining Co. | Laramie | 3,000 | S&C | 4,500 | Burton | | | | |
| Northwestern Petroleum Co. | Osage | 300 | S | .... | | F. W. Palis* | | | |
| Producers & Refiners Corp. | Parco | 8,000 | S-C | 4,000 | Dubbs | L. M. Johnston | See Oklahoma | See Oklahoma | See Oklahoma |
| Texas Company, The | Casper | 6,000 | Comp. | 7,800 | Holmes-Manley | A. S. Bailey | See Texas | See Texas | See Texas |
| White Eagle Oil & Ref. Co. | Casper | 6,000 | S-C | 2,500 | Holmes-Manley Jenkins | J. W. Glass | See Kansas | See Kansas | |

all the cracking plants. See Indiana for personnel of Standard company

# 1928 Refinery Survey, Shut-Down Plants by States

### ARKANSAS

| Company, Plant Location— | Daily Cap. (bbls.) | Type of Plant | Type Cracking Process |
|---|---|---|---|
| Home Refining Co., Camden | 500 | S | |
| Home Oil & Refining Co., Hot Springs | 500 | S | |
| Houston Oil Co., Camden | 3,000 | S&C | Dubbs |
| E. M. Tulle Refinery | 1,000 | S | |
| Total | 5,000 | | |

### CALIFORNIA

| | | | |
|---|---|---|---|
| Brown Process Co., Maricopa | 5,000 | S | |
| Brown Process Co., Hynes | 5,000 | S | |
| California Eastern Oil, Hynes | 6,000 | S | |
| California Refining Co., Long Beach | 2,000 | T | |
| Commercial Refining Co., Hynes | 2,000 | T | |
| Delaney Producing & Refining Co., Long Beach | 3,000 | S | |
| Dominion Oil Co., Los Angeles | 750 | S | |
| East-West Refining Co., Los Angeles | 1,000 | T | |
| Eureka Refining Co., Los Angeles | 5,000 | S | |
| Harbor Refining Co., Los Angeles | 2,000 | T | |
| Hart Dearing Refining Co., Fellows | 3,000 | T | |
| Holly Oil Co., Huntington Beach | 3,000 | T | |
| Paraffin Co., Inc., Emeryville | 1,100 | A | |
| Perfection Refining Co., Hynes | 1,000 | T | |
| Pioneer Paper Co., Los Angeles, Vernon | 700 | A | |
| Producers Refining Co., Kern River | 500 | L | |
| Sentinel Oil Co., Los Angeles | 1,000 | S | |
| Union Oil Co. of California, Avila | 10,000 | T | |
| Western Refining Co., Wilmington | 3,000 | T | |
| Wilmington Petroleum Corp., Wilmington | 500 | L | |
| Wilshire Oil Co., Fellows | 2,500 | S | |
| Total | 58,050 | | |

### ILLINOIS

| | | | |
|---|---|---|---|
| Interocean Refining Co., McCook | 5,000 | S&L | |
| Lemont Refining Co., Lemont | 1,200 | S&C | Lemont |
| Martin Oil & Refining Co., Osborne | 1,000 | L | |
| Total | 7,200 | | |

### INDIANA

| | | | |
|---|---|---|---|
| Portland Oil & Refining Co., Portland | 600 | S&C | Fleming |
| Interstate Gasoline Co., East Chicago | 2,500 | S&C | Greenstreet |
| Power Plus Oil Co., Columbus | 1,200 | S | |
| Total | 4,300 | | |

### IOWA

| | | | |
|---|---|---|---|
| Omaha Refining Co., East Omaha | 1,500 | S&C | Cross |

### KANSAS

| | | | |
|---|---|---|---|
| Arkansas City Refining Co., Arkansas City | 8,000 | S&C | Dubbs |
| Commonwealth Oil Refining Co., Moran | 1,000 | S | |
| Chemical Oil & Gas Co., Osawatomie | 1,000 | S | |
| Derby Oil Co. (Russell County Pipe Line Co.) | 2,500 | S | |
| Grant Oil Co., Augusta | 2,500 | S&C | Jenkins |
| K-T Oil Corp., Wichita | 1,000 | S | |
| Lesh Refining Co., Arkansas City | 2,000 | S | |
| Miller Petroleum Co., Humboldt | 2,500 | S&C | Cross |
| Red Bird Refining Co, Fredonia | 200 | S | |
| Richardson Refining Co., Eldorado | 1,500 | S | |
| United Oil & Refining Co., Hutchinson | 2,500 | S | |
| Total | 24,700 | | |

### KENTUCKY

| | | | |
|---|---|---|---|
| Central Producing & Refining Co., Bowling Green | 600 | S | |
| Fayette Refining & Storage Co., Lexington | 500 | S | |
| Great Southern Refining Co., Lexington | 2,500 | S&L | |
| Neha Refining Co., Lexington | 800 | S | |
| Petroleum Refining Co., Latonia | 2,000 | S&L | Cross |
| Standard Oil Co. of Kentucky, Louisville | 5,000 | S&L | Burton |
| Total | 11,400 | | |

### LOUISIANA

| | | | |
|---|---|---|---|
| Alexandria Refining Co., Alexandria | 600 | S&C | |
| Delart Refining Co., Lafayette | 300 | S | |
| Great Southern Refining Co., Ardis | 2,000 | S | |
| Gulf Coast Refining Co., Good Hope | 10,000 | S&A | |
| Red River Refining Co., Crichton | 1,800 | S | |
| Southern Oil & Refining Co, Oil City | 1,500 | S | |
| Total | 16,200 | | |

### MARYLAND

| | | | |
|---|---|---|---|
| Interocean Refining Co., Baltimore | 7,000 | S&C | Leamon and Dubbs |

### MISSOURI

| | | | |
|---|---|---|---|
| Interstate Rubber Producing Co., Kansas City | 3,000 | S&C | Muehl |
| Marshall & Co., Sheffield | 2,500 | S | |
| Total | 5,500 | | |

### MONTANA

| | | | |
|---|---|---|---|
| American Refining Co., Great Falls | 1,000 | S | |
| Big West Oil Co., Kevin | 1,200 | S | |
| Montana Refining Co., Billings | 750 | S | |
| Round Up Oil & Refining Co., Butte | 200 | S | |
| Silver Bow Refining Co., Butte | 100 | S | |
| Sunburst Refining Co., Great Falls | 3,000 | S | |
| Total | 6,250 | | |

### NEW MEXICO

| | | | |
|---|---|---|---|
| Bloomfield Oil & Gas Co., Bloomfield | 300 | S | |
| Sullivan Refineries, Inc., Dayton | 1,500 | | |
| Sullivan Refineries, Inc., Clovis | 500 | | |
| Total | 2,300 | | |

### OHIO

| | | | |
|---|---|---|---|
| Akron Oil Refining Co., Akron | 750 | S | |
| *Ohio Refining Co., Cincinnati | 1,700 | S | |
| Rajah Oil & Refining Co., Youngstown | 500 | S&L | |
| Total | 2,950 | | |

*Owned by Louisiana Oil Corp., Shreveport.

### OKLAHOMA

| | | | |
|---|---|---|---|
| Carter Oil Co, Cartoco | 5,000 | S | |
| Chestnut & Smith Corp., Sand Springs | 5,000 | S | |
| Coleman Nelson Corp., West Tulsa | 1,500 | S | |
| Constant Refining Co., West Tulsa | 2,500 | S | |
| Francis Oil & Refining Co., Francis | 1,000 | S | |
| Gilmer Oil Co., Ringling | 1,000 | S | |
| Imperial Refining Co., Ardmore | 5,000 | S&C | Dubbs |
| Indian Chief Refining Co., Cushing | 1,800 | S | |
| Inland Refining Co., Cushing | 1,000 | S | |
| Interocean Refining Co., Bristow | 4,000 | S | |
| Lawton Refining Co., Lawton | 1,000 | S | |
| Maud Oil & Gas Co., Maud | 400 | S | |
| Mid-Co Gasoline Co., West Tulsa | 4,500 | S&L | |
| Newkirk Oil & Refining Co., Newkirk | 2,000 | S | |
| Oil State Refining Co., Enid | 1,800 | S | |
| Pauline Refining Co., Hampton | 1,200 | S | |
| Producers & Refiners Corp., Blackwell | 3,000 | S | |
| Pure Oil Co., Ardmore | 5,500 | S&C | Dubbs |
| Red Seal Refining Corp., Oklahoma City | 2,000 | S | |
| Santa Fe Oil & Refining Co., Ardmore | 5,000 | S | |
| Sinclair Refining Co, Cushing | 6,000 | S | |
| Sayre Oil & Refining Co., Sayre | 500 | S | |
| Superior Oil Corp., Grandfield | 2,000 | S | |
| Texas Pacific Coal & Oil Co., Wynnewood | 2,500 | S&C | Dubbs |
| Turley Petroleum Co., Oklahoma City | 2,500 | S | |
| Valley Osage Oil Co., Okmulgee | 2,500 | S | |
| Total | 70,200 | | |

### PENNSYLVANIA

| | | | |
|---|---|---|---|
| Beaver Refining Co., Washington | 200 | S | |
| Chippewa Oil Co., West Bridgewater | 300 | L | |
| *Franklin Creek Refining Co., Franklin | 500 | L | |
| North Penn Refining Co., Tiona | 500 | S&L | |
| White Oil Corp., Clarendon | 1,000 | L | |
| Total | 2,500 | | |

*Leased from Lakeside Oil Refining Co.

### TENNESSEE

| | | | |
|---|---|---|---|
| Gillespie Oil Corp., Gallatin | 250 | S | |
| Nashville Oil Co., Nashville | 500 | S | |
| Total | 750 | | |

### TEXAS

| | | | |
|---|---|---|---|
| Anderson-Prichard Oil Corp. (Western), Wichita Falls | 2,000 | S | |
| American Oil Co., Pioneer | 1,200 | S | |
| Boardman Oil Co., Wichita Falls | 750 | S | |
| Bridgeport Refining Co., Bridgeport | 800 | S | |
| Brownwood Producing & Refining Co, Brownwood | 200 | S | |
| Crystal Oil Corp., Burkburnett | 1,000 | S | |
| De Leon Pipe Line & Refining Co., De Leon | 1,500 | S | |
| Denison Oil & Refining Co., Denison | 1,000 | S | |
| Four States Refining Co., Texarkana | 700 | S | |
| Freeport Asphalt Co., Freeport | 5,000 | T&A | |
| *Galena-Signal Oil Co., Galena | 10,000 | S&C | Burton T&T |
| Hagaman Refinery Corp., Ranger | 2,000 | S | |
| Houston Terminal Refining Co., Houston | 3,500 | S | |
| Humble Oil & Refining Co., Burkburnett | 4,000 | S&C | T&T |
| Interstate Gasoline Co., Iowa Park | 2,500 | S | |
| Interstate Refineries, Inc., Tiffin | 2,000 | S | |
| Interstate Refineries, Inc., Ranger | 2,000 | S | |
| Keen & Woolf Co., Clinton | 2,000 | S&L | |
| Megargel Oil & Refining Co, Wichita Falls | 1,500 | S | |
| Mexia Oil & Refining Co., Mexia | 500 | S | |
| National Refining Co. of Texas, Greenville | 2,000 | S | |
| Oriental Refining Co., Dallas | 5,000 | S | Floyd |
| Paterson Oil Co., Brownwood | 1,000 | S | |
| Petroleum Corp., Electra | 1,500 | S | |
| Pierce Petroleum Corp., Fort Worth | 8,000 | S | |
| Pierce Petroleum Corp., Texas City | 5,000 | S | |
| Primrose Petroleum Co., Inc, Wichita Falls | 1,500 | S | |
| Southwestern Refining Co., Sour Lake | 1,000 | L | |
| South Bosque Refining Co., South Bosque | 1,000 | S | |
| Star Producing & Refining Co., Fort Worth | 1,800 | S&C | Fleming |
| Swastika Refining Co., Muenster | 1,000 | S | |
| Sweetwater Refining Co., Sweetwater | 500 | S | |
| Texas Mexican Oil & Refining Co., Laredo | 600 | S&L | |
| Texas Oil Products Co., Waxahachie | 2,500 | S | |
| Valley Refining Co., Wichita Falls | 2,500 | S | |
| Waco Refining & Pipe Line Co., East Waco | 2,500 | S | |
| White Eagle Oil & Refining Co., Fort Worth | 4,000 | S&C | Holmes-Manley |
| Yuba Oil Refining Co., Nacogdoches | 100 | S&L | |
| Total | 85,650 | | |

*McDonald Meachum, receiver.

(Continued on Page 169)

# Heating Surfaces that give Constant Heat Absorption

FOSTER Oil Stills use graduated heat absorbing surfaces to maintain an even rate of heat transfer per lineal foot of tube. Bare roof tubes are used to absorb radiant heat, moderately extended surface ("corrugated rings") are used in the high gas temperatures and gilled rings are used in the cooler gas zones.

With the compensating effect of extended surface, added to counter-flow principles in Foster Oil Stills, the theoretical maximum efficiency is closely approximated.

FOSTER WHEELER CORPORATION
165 Broadway, New York, N. Y.
*Branches in principal cities.*
*Foreign Associates:*
POWER SPECIALTY COMPANY, Ltd.
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**FOSTER WHEELER**

FRACTIONATING TOWERS HEAT EXCHANGERS
STEAM JET AIR PUMPS SUPERHEATERS
TUBE STILLS VACUUM PUMPS
WATER COOLED FURNACE SURFACES
BRASS AND COPPER TUBING AND PIPE

AERO UNIT COAL PULVERIZERS
AIR HEATERS CENTRIFUGAL PUMPS
CONDENSERS COOLING TOWERS
ECONOMIZERS EVAPORATORS
EXPANSION JOINTS FEED WATER HEATERS

# FLUID-FUSION

### *Fluid-Fusion Process*

The P.I.W. FLUID-FUSION welding process is not to be confused in any way with ordinary commercial welding because—

*It is automatic and eliminates the human element*

*It is a combination of chemical, mechanical and electrical action*

*It excludes all impurities and bonds the parts together so perfectly and intimately that a joint can hardly be said to exist*

*It withstands far greater tension and torsion stress throughout the welded area than the plate itself.*

Further particulars and details of tests will be submitted to persons interested in the application of this method to problems of pressure, temperature, or corrosion.

## For the resistance of pressure and temperature, and in stainless steel for acid and corrosion resistance.

Whether you require a small vessel of irregular contour, or one of such proportions as to tax transportation limits the vast steel plate fabricating facilities of P.I.W. working with the FLUID-FUSION process will be more than equal to the task. The ultimate wall thickness will greatly exceed plate mill rolling limits.

P.I.W. engineers will gladly consult on your problems.

P.I.W.
STEEL PLATE CONSTRUCTION

***P. I. W. Products Include***

"Pennsylvania" Tank Cars
Oil Refinery Equipment
Tanks up to 120,000 Bbls. Capacity
Agitators
Stills
Condenser Boxes
Smokestacks
Standpipes
Water Tanks
Penstocks
Riveted Steel Pipe
Metal Ladles
Annealing Boxes
Blast Furnace Equipment
Storage Bins
General Light and Heavy Steel Plate Construction
P.I.W. Steel Shipping Barrels

The
PETROLEUM
IRON WORKS
COMPANY
SHARON, PA.
BRANCH PLANT
BEAUMONT TEXAS

NEW YORK CHICAGO HOUSTON TULSA

## RESEARCH WILL HELP STABILIZE THE INDUSTRY

(Continued from Page 105)

he manufacturer of the synthetic product can lower the price of isopropyl alcohol and still show a profit, the isopropyl alcohol derived from acetone will no longer be a factor in the market.

There are many other marketes which will furnish large outlets for petroleum derivatives when they become available in quantity. The nature and extent of these markets are purely speculative in the light of our present knowledge. Many of them would probably have to be developed as the synthetic chemical industry expanded. They would have the advantage, however, of being relatively free from competition.

The hidden treasures of petroleum, the extent and richness of which I have attempted to sketch (outline) for you, can be uncovered by research. If we survey other major industries such as cement, gas, electric, leather and steel, we find that they maintain co-operative research organizations. These research laboratories have developed new products, introduced untold economies, led the way to scientific marketing and have saved millions of dollars for their respective industries.

### Gas Industries

In the past two or three years the petroleum industry has watched with interest the progress of the research program instituted by the Natural Gasoline Association of America. This program is supported by funds assessed from the members of the association and the information so obtained is imparted to all of its members. Much credit should be given to this association for its courage and foresight in pioneering a co-operative research program of this nature. The American Gas Association has been maintaining a similar program for the natural gas industry.

The step that the natural gas and gasoline branches have taken in establishing co-operative research programs for the development of new products and the enlargement of present markets is applicable to the entire petroleum industry. A centralized research program supported by the petroleum industry as a whole would economize on funds and personnel, minimize the duplication of work, co-ordinate discoveries and the benefits accruing from such a program would be greater than any results obtained by independent research on the part of various divisions of the industry. The different branches of the petroleum industry are interdependent and the general prosperity of one is conditional upon the prosperity of the others. Due to this interdependency, the scope of the problem and the fact that the petroleum industry is dealing with essentially the same class of chemical material, it is vital that the entire industry unite in a co-operative research program.

The oil industry is faced with the necessity of immediately developing new outlets for its products. However, our store of fundamental data concerning the chemical and physical properties of the compounds which constitute petroleum is relatively meager. Hence it would seem that the centralized research program should be divided into two lines of endeavor:

1. The immediate development of the more obvious possibilities for the wider utilization of petroleum products.

2. Extensive research into the basic chemical and physical properties of the hydrocarbon series composing petroleum.

The data gathered here would be the basis for further expansion in the development of synthetic petroleum products.

These are a few of the vast number of possibilities in the application of petroleum and its allied gases. No doubt the field has only been scratched and organized and exhaustive research will surely develop many other products now unknown to anyone.

In subscribing to a program for petroleum research it must be borne in mind that Rome was not built in a day and in investing in a co-operative enterprise of this nature, we cannot reasonably expect to immediately revolutionize the petroleum industry. We could, however, expect to find that the dividends from this investment would be cumulative and would compound with the passage of time. The day may arrive when gasoline will be only a by-product of petroleum when considered from the point of view of net profit.

## DEVELOP NEW OUTLETS: SANE OPERATION FOR 1928

(Continued from Page 118)

due largely to the construction of permanent highways. There are two ways, I believe, to bring back this demand:

The first is to inaugurate a movement to have the railroads throughout the United States oil their roadbeds, thus making passenger travel a comfort and a pleasure. One of the leading trunk lines of the country has very courteously given us the figures for oiling part of its roadbed, which figures include the amount of oil used per mile. These figures show that it took approximately 1,580 gallons of oil per mile; that the cost of the oil was $37.68 per mile, and the labor and use of work train applying this oil cost $5.52 per mile, making a total cost per mile of $43.20. I believe the railroads can be sold on this proposition, and am sure that they would find that, with their roadbeds oiled and using fuel oil to propel their locomotives, the added comfort and pleasure derived by their patrons, would increase the passenger traffic more than enough to offset this small expenditure of $43.20 per mile.

The second proposition is to approach the State Highway Commissions and suggest to them the great advantage in oiling the unpaved highways under State jurisdiction, which lead into the main highways already permanently improved. This would give a good approach to the paved highway and keep down the dust and mud from accumulating on the paved highway. I am of the opinion that we can sell the several State Highway Commissions many thousands of gallons of road oil during the coming season.

This is extremely helpful to the refining branch of the petroleum industry, as the use of road oil and its application is in the season of the year when the demand for fuel oil is light.

Another factor that will create a greater consumption of petroleum products is the increased use of the airplanes by the Government for carrying the mails, and by the public as means of exepeditious transportation for commercial purposes. The quantities of both gasoline and lubricating oils used in propelling airplanes differs, of course, largely in the type of the plane and its size, but the average plane will use a gallon of gasoline every 3 miles and a gallon of lubricating oil every 75 miles. So, with the airplane forming a part of our transportation system, you can readily see that a large volume of petroleum will be consumed, which, up to the present time, had been relatively small.

We must not lose sight of the tractor as a large consumer of petroleum products, and its use is being constantly expanded, as I have been reliably informed that the International Harvester Co., one of the largest manufacturers of tractors, is behind in its orders.

With these increased uses for petroleum products, and with the refinery operations restricted to meet only the demands for finished products, the refining division of the oil industry should show a very marked improvement in 1928 over the year 1927.

## PROPER APPLICATION OF RADIANT HEAT

(Continued from Page 118)

ant heat, since the refractories were essentially impervious to the radiant rays. These tubes, therefore, were primarily dependent on the heat conducted through the tile covering, and since these tile were in most cases composed of fireclay, which is not a good conductor of heat, the transfer rate was low. To overcome this condition, some of the tile were removed at intervals until the desired rate of transfer was secured or until tube trouble resulted.

Certain engineers utilized the idea of tempering the gases by recirculating a portion of the waste gases, and forcing these gases back again into the furnace. This helped conditions and permitted better economies, at the same time increasing the heat transfer rate because of increased gas velocities. It necessitated, however, expensive blowers and ducts, greatly increased the first cost, and at the same time was a source of constant expense for both power and maintenance.

### Conditions for Furnace Efficiency

The importance of furnace efficiency has now become generally recognized and the following conditions are regarded as almost fundamental:

1. Sufficient air for complete combustion of the fuel but with little or no excess. A preheated combustion air further improves operating conditions and reduces stack losses.

2. Thorough mixing of the fuel and air.

3. High furnace temperatures until the fuel is completely burned.

4. Sufficient furnace volume to insure the necessary time for the combustion to be completed before the gases come in contact with the heat-absorbing structure, since otherwise secondary combustion may result accompanied by excessive temperatures or incomplete combustion.

5. Proper arrangement of the heat-absorbing surface to insure uniform and efficient heat transfer.

In this connection the effect of high temperatures on the time required and consequently on the necessary furnace volume, should be kept in mind, since the speed of the combustion reaction is very greatly increased by increasing the temperature at which combustion takes place.

Any heater constructed to avoid the transfer of direct radiant heat must of necessity depend primarily on taking the heat from the gases by convection. This is best accomplished by making the gases wash the tubes at rather high velocities, therefore the tubes are usually grouped in high, narrow banks, the restricted cross section causing the gases to travel at the desired rate. The first and second rows of tubes in such a bank are subjected to the highest temperature gases, and at the same time receive practically 90 per cent of any radiant heat that may be reflected from the walls.

This condition compels these first few tubes to take up a very large proportion of the total heat input, and these are the tubes which in general give the most trouble. The remaining rows usually absorb heat at comparatively low rates.

Obviously, any attempt to increase the throughput of a unit by increasing the temperature of the gases would result in still greater overloading of the tubes in the first few rows. If, however, the radiant-heat temperatures can be properly controlled, advantage can then be taken of the correspondingly higher transfer rates, and the necessity for high gas velocities is avoided. Under these conditions, a very much greater number of tubes can be exposed to the heat radiated and a wide bank of only a few rows of tubes can be used. That this principle is correct is indicated by the present trend in boiler design where, particularly in central-station work, the necessity for operating at maximum ratings has resulted in furnace designs and operation in which every effort is made to bring the percentage of radiant heat to the maximum. Highly preheated combustion air, carefully regulated, is used to secure high furnace temperatures and the gases are made to wash the furnace walls so that a maximum of their heat is transmitted to the tubes as radiant heat. This condition has been carried to a point where the refractories themselves are the limitation.

Probably the best example of a radiant-heat furnace would be one heated by electrical resistors, where there are no combustion gases to handle. This type of furnace is in common use in the laboratories and among the oil chemists where a close regulation of temperature and a uniform distribution and application of the heat is essential. This then would be the ultimate in furnace design and the ability to approximate these conditions should be the aim of the engineer. At the same time the coil design should be so handled that each and every tube absorbs heat evenly and at as high a rate as circumstances permit. Not only do ineffective tubes greatly increase the first cost, but because of the added resistance, particularly where high oil pressures and velocities are in use, they very considerably increase the cost of pumping, both for power and for equipment. Because of this feature it is frequently poor economy to rely on additional tubes to reduce the exit-gas temperature, which can be done at less cost and more effectively by air heat exchangers, provided the increased gas temperatures do not cause difficulties.

### Radiant-Heat Furnace

Comparatively recently improvements in refractories have made possible furnace designs which permit of the combustion of the fuel at extremely high temperatures, and with little or no excess air. These refractories are extremely dense, have a high factor of conductivity (roughly 8 to 10 times that of ordinary fireclay), are not impaired by the gases of combustion, and will withstand the highest temperatures that can be secured in commercial operation. A refractory composed of practically pure silicon carbide grain, known as carborundum, answers these requirements.

By taking advantage of these valuable physical characteristics to produce and control radiant heat, a furnace can be designed (Figure 1) which will have many of the desirable features of an electrically heated furnace without the excessive costs of installation and operation. To this end, both the fuel and the necessary air for combustion are introduced and burned within a tunnel or long chamber having carborundum walls and known as a carboradiant or carborundum furnace. In such a furnace all of the essentials for higher combustion efficiency previously noted are secured. The necessary air for combustion can be closely controlled and may be preheated to almost and desired temperature. The fuel (either gas, well atomized oil, or powdered coal) with the air for combustion, passes through the restricted cross section formed by the carborundum walls at velocities of several thousand feet per minute, insuring complete mixing of the fuel and air. Since the combustion takes place completely within the carborundum walls, and preferably with an already preheated combustion air, extremely high temperatures are generated; which, however, are entirely screened from the heat-absorbing structure by the carborundum walls. The gases, therefore, cannot become chilled and the combustion is carried out without any retarding action whatever. These ideal conditions result in much higher combustion rates, and experimental work indicates that a heat release many times in excess of common practice can be secured without difficulty.

### Control of Temperature

The high internal furnace temperature results in the carborundum walls becoming incandescent, and in operation they assume a balance depending on the amount of heat being generated, and the heat being absorbed. Because of the high conductivity of the carborundum tile, the heat easily passes through the furnace walls, and in practice the outside surface usually assumes a temperature of from 1,400 degrees to 1,600 degrees Fahrenheit, thus providing a positive source of radiant heat. This temperature can be more or less controlled by varying the furnace proportions, and can be materially increased by using highly preheated combustion air and relatively smaller areas of heat-absorbing structure. This provides a means of generating heat under almost theoretical combustion conditions which can be so controlled that almost any desired temperature can be maintained. Since a maximum of the heat generated is disposed of as radiant heat,

the heat left in the gases is materially reduced, resulting in lower gas temperatures, and the necessity for recirculation is eliminated. Moreover, with little or no excess air the gas volumes are smaller, and in consequence the stack losses are reduced to a minimum.

By the use of carborundum furnaces, therefore, the general furnace design can be greatly simplified and the cost materially reduced. The heat-absorbing surface may be divided into two sections, one of which is heated only by radiant heat so evenly distributed and so closely controlled that oils, even at high temperatures and pressures, can be subjected to high heat input without danger to either the structure or to the oil. The remaining tubes take their heat from the resulting waste gases which, having given up a considerable portion of their heat, are necessarily at lower temperatures. As combustion is entirely completed in the carborundum furnace, there is no danger from secondary combustion. A higher average rate of heat input can therefore be maintained, and a lesser amount of heating surface or tubes is required. The fact that a considerable portion of the setting is completely separated from contact with the combustion gases permits of the use of special insulating refractories, having relatively poor resistance to flame erosion but high insulating value. This construction insures a minimum of radiation losses with lower construction costs. The size of the units for the same capacities can be made less and the cost of construction further reduced.

**Heat Distribution with Radiant Heat**

The ability to control the heat distribution where radiant heat only is used is most advantageous in cracking, and offers a simple means of providing a closely controlled soaking period. For example, it has been pretty well established that if three rows of tubes are used in the section heated only by radiant heat, the respective rows will take up heat in the proportion of 6-3-1. That is, if the row nearest the source of heat absorbs heat at the rate of 12,000 B.t.u. per square foot, the second or middle row will take up heat at the rate of about 6,000 B.t.u., while the heat input in the upper or third row would only be about 2,000 B.t.u. per square foot. This ratio is naturally somewhat dependent on the oil temperatures. It is obvious, therefore, that if a greater rate of heat input is desired, one or at the most two rows of tubes should be used. For pipe heaters this works out to best advantage. However, in cracking, some refinery engineers advocate a soaking period or time after the oil has attained a cracking temperature, during which heat is supplied at a very moderate rate, sufficient to raise the temperature very slightly and at the same time supply such heat as may be required for cracking. This condition can be readily secured by a third row of tubes heated only by radiant heat.

Recent developments in cracking in the vapor stage, where higher temperatures are required, and where the oil vapor does not take away the heat as rapidly from the tube walls, have made even heat distribution and application essential. Here the advantages of controlled radiant heat are obvious.

**Advantages of Radiant Heat**

To sum up, therefore, it is believed that, contrary to previously accepted ideas, radiant heat, when properly controlled, is a most desirable means of applying heat to petroleum products, since by its use the following advantages may be secured:

1. Higher rates of heat input into the oil without danger to either the structure or to the product.

2. More uniform heat input over the entire heat-absorbing surface, since the variable of excessively high temperature gases is eliminated.

3. Correspondingly smaller and less expensive units for the same throughput.

4. Better fuel economies, since there is no necessity for large quantities of excess air, and better combustion conditions result, with heat losses reduced to a minimum.

5. Higher yields under comparative conditions, with improved products, since uniform heating keeps the formation of coke and fixed gas at a minimum.

6. In the case of cracking coils and pipe heaters, a greater percentage of operating hours, as the lack of coke formation and absence of tube trouble reduces the necessity for shutdowns.

7. Safety. An even heat "bath" for that part of the equipment carrying oil at high temperatures and pressures, with no possibility of excessive temperatures from secondary combustion.

It is apparent that the trend of the industry today demands close attention to the above conditions. Cracking in the vapor stage will probably require even higher temperatures than are now in common use. Moreover, the vapor under these conditions possibly will not take the heat away from the metal surfaces with the same rapidity as the oil does in the processes now used. This will undoubtedly result in refiners demanding higher rates of heat input but without too great temperature differences. Uniform heating will be essential, and it is believed this can best be secured by controlled radiant heat.

At this time units are in operation in which a heat input of better than 30,000 B.t.u. per square foot of tube area is secured at certain parts of the coil. Other parts of the same heater are absorbing heat at greatly reduced rates. It it can be demonstrated that tube structure and the oil being processed can withstand such rates of transfer commercially, then with the even heat distribution possible through the use of radiant heat only, a much higher average rate of heat input can readily be maintained. To secure this condition it is essential that the tubes shall receive the radiant heat rays directly, without the interposition of any shield or screen whatever, but rather with as many tubes as possible so placed as to receive the maximum of the radiant heat available.

A heating coil designed to insure such conditions, and operating at the higher temperatures now coming into use, might take the form shown on the attached drawing, although the principles involved permit of several modifications of the general arrangements. To illustrate what might be expected in the operation of such a unit, and to indicate the relative transfer rates which might be expected, we give the following estimated figures based on 28-foot lengths of exposed tube of 4-inch outside diameter.

Assuming a generation of 30,000,000 B.t.u. and an overall efficiency of 80 per cent, which we are confident can be secured by passing the waste gases through an air heat exchanger and supplying a preheated combustion air, the heat input to the oil should approximate 24,000,000 B.t.u. This would be divided among the various sections of the tube bank roughly as follows:

| | |
|---|---|
| 24 radiant tubes, 672 sq. ft. @ 20,000 B.t.u. per sq. ft. average .. | 13,440,000 radiant only |
| 20 secondary rad. tubes, 560 sq. ft. @ 10,000 B.t.u. per sq. ft. average | 5,600,000 chiefly radiant |
| 14 combination tubes, 392 sq. ft. @ 5,000 B.t.u. per sq. ft. average | 1,960,000 chiefly convection |
| 20 convection tubes, 560 sq. ft. @ 5,000 B.t.u. per sq. ft. average | 2,800,000 convection only |
| Total | 23,800,000 |

This indicates a total of roughly 80 per cent of the heat input entering the oil as radiant heat, and such high average rates of transfer must of necessity be dependent on a most even heat distribution, which in our judgment can best be secured by controlled radiant heat.

## ACID-SLUDGE PROBLEM IN OIL REFINING

(Continued from Page 102)

plants was said to be obtainable by bubbling air through the acid, and by cascade systems of fused silica basins. However, while a "pan and still" plant was built on the West Coast as late as 1920, and while many such plants are no doubt still in use, the trend in the last seven years has been away from such methods of concentration.

In a number of refineries, particularly in the East, the final concentration of the acid was conducted in glass retorts or "bottles," holding about 750 pounds of 62 degree Baume acid. This type of installation also delivered acid of 66 degree Baume strength. When the bottles were carefully set and properly handled, the loss in breakage in a bottle plant was said to be small. However, the operation was intermittent or "batch," instead of being continuous, as was the case with the pan or "still" system, and the fuel cost was high. Furthermore, this method of final concentration was decidedly dangerous. There was no way adequately to test a "bottle" before it was put into service, and the failure of a bottle frequently resulted in dumping 700 pounds or more of concentrated acid at a high temperature on the floor of the bottle house. Refinery superintendents and foremen showed an entirely justifiable lack of interest in what was going on in the bottle house, and their inspections of operations frequently consisted in going in at one door of the house and out the other as rapidly as possible.

**Systems of Concentration**

The first plant on a semicommercial scale for the continuous concentration of acid by bubbling hot flue gases through it was erected at Brooklyn in 1919, and the first fully commercial plant of this type was erected at Buffalo, N. Y., during the next year. This was followed by an installation at Providence, R. I., a short time later. Many such plants are scattered through the United States today.

This type of sludge-acid concentration is known as the Chemico process, and is based on the fact that when a mixture of hot air and flue gases is passed through the liquid to be concentrated a substantially lower temperature may be carried than is required for pan concentration. In addition, heat transfer is better, and fuel costs correspondingly reduced. The total operating costs, including fuel, labor, general expenses and repairs, losses and royalty, is said to be fully 50 per cent lower than with the pan and still system.

Another system of sludge-acid concentration, known as the Simonson-Mantius process, is based on the principle of vacuum distillation, with its well-known advantages. The first plant of this type was erected at Paulsboro, N. J., several years ago, and a number of other plants of this kind have been put into operation since that time.

A more recent development is the Geyser system. This process resembles the Chemico process in that hot flue gases are used to supply the heat needed for evaporation of the water, but differs from it in that the evaporation is accomplished by blowing the flue gases across the surface of the liquid, which is kept in a violent state of ebullition by means of an independent stream of air.

The Chemico and Vacuum processes are two-stage systems, in which the first concentration is to 60 to 62 degrees Baume, and the final concentration to 66 degrees Baume. The Geyser system is a one-stage process.

While great progress has undoubtedly been made in reducing the cost and nuisance of sludge-acid concentration, the nature of the material to be handled is such that this part of refinery operation still remains a troublesome and expensive procedure.

**Disposal by Burning**

The solution of the sludge disposal problem by burning the sludge has probably been attempted at one time or another by almost every refinery superintendent. Burning the sludge direct, without separation or fluxing, has been practiced to a certain extent. Burning after fluxing, without separation of acid, has also been tried. Burning after separation, either with or without fluxing, and burning the "coked" separated sludge, have been practiced for a long time.

At a large refinery on the Pacific Coast it was formerly the practice to burn lubricating-oil sludges under boilers without any preparation whatever except separation of the loose acid. In order to facilitate combustion, the boiler furnaces were fitted with dutch ovens, which reduced to a very considerable extent the tendency to throw unburned agglomerations of soft carbon out through the stacks. Of course, in such a system all of the sulphuric acid in the sludge went out of the stacks as acid or as sulphur dioxide and possibly trioxide, and it would not be possible to practice such a method of sludge disposal except in localities where the neighbors were few.

At one plant in the Mid-Continent Field, partly neutralized sludge is mixed with about 20 degree A.P.I. fuel oil and burned in a specially designed burner with a vibrating valve stem. This type of sludge burning has been tried elsewhere and with varying success, depending on the nature of the sludge at hand.

The operation and maintenance of such systems as the above are both troublesome and expensive. Acid-resisting linings and pumps have to be provided, and even when the sludge is kept circulating all the time, line plugging is frequent.

Burning separated sludges from gasoline and kerosene treats from stock of Mid-Continent origin is relatively a simple matter. Such sludges are generally fluid enough to burn without fluxing, although there is frequently a certain amount of pitch-like material which cannot be pumped conveniently.

At one time, in an eastern refinery, sludges from the treatment of crude oil intended for cylinder stock were fluxed after the separation of the acid. Fluxing was done with heavy Mexican fuel oil with the aid of open steam in separators of about 500 bbls. capacity. The fluxed sludge was then pumped about 1,000 feet to a boiler house and burned. This system worked in a satisfactory manner as long as the sludge was separated and fluxed within 24 hours after it was produced. If allowed to "ripen" for several days before separation was attempted, it was almost impossible to secure adequate separation of acid or a satisfactory fluxed fuel.

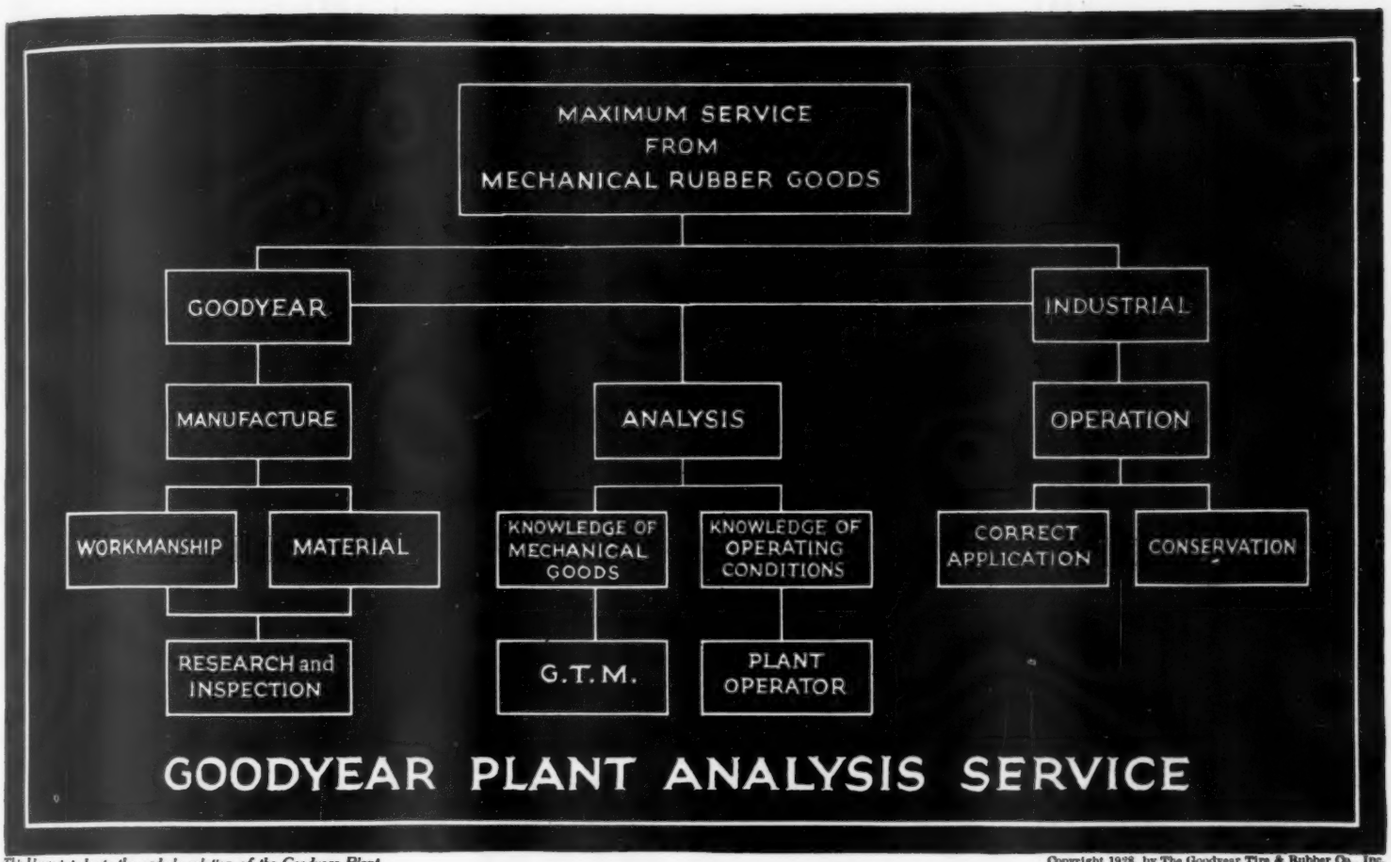
The method of coking lubricating oil sludges has been described above under methods of sludge separation. For types of sludge that respond to this treatment, this is probably the best way to handle the problem. This is largely due to the fact that sludges that may be coked readily are very difficult to flux, and vice versa.

The proper method of disposal of sludges is very largely dependent on local conditions and each refiner has a different problem to solve. We do not have, and probably never will have, a single method of sludge disposal that is applicable to all conditions.

**Fume Nuisance**

Very early in the history of the petroleum industry, petroleum refineries were confronted with the fume nuisance problem, and about 1858, Col. C. A. Ferris, of New York, was "forced to move his plant because his neighbors objected to the strange and unsavory odors caused by the distillation and refining of oils." At the present time the disposal of sulphur dioxide and other fumes resulting from the separation and concentration of sludge acid is a problem of some magnitude. As early as 1880, E. Clark obtained a patent for a procedure for recovering spent acid from acid sludge, in which the offensive vapors were conducted off by an exhaust produced by an induced steam blast while the sludge was agitated with steam.

Fumes, particularly sulphur dioxide, may be evolved at a number of points in treating, separating and concentrating. Batch treatment of lubricating oils is a prolific source of sulphur dioxide, especially when that gas has to be blown out of the oil by air prior to contact clay application. Closed continuous treating systems for lighter oils are, of course, free from this nuisance. Sludge separators of the batch type are also large producers of sulphur dioxide, especially when the sludge has had a chance to "ripen" before separation. The volume of sulphur dioxide evolved from

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sludge from 66 degree acid treatment of gasoline and kerosene distillates was found in one case to be eight times the volume of the sludge when the latter had been allowed to stand only 24 hours before separating. Batch lubricating oil sludge separators, where steam has to be used to effect separation, also add to the quantity of sulphur dioxide produced. Sulphur dioxide also inevitably accompanies any attempt to burn acid sludge direct, or after fluxing, or to burn fluxed or unfluxed residues of separated sludge or solid sludge.

The most prolific source of sulphur dioxide, however, is the acid concentration plant. The old pan-and-still systems were notorious in this respect. In the Chemico type of concentrator, in the earlier installations, the fumes were scrubbed in packed towers with water. The more recent installations, however, use the Cottrell electrical precipitator. This type of scrubber has the advantage of higher exit temperature for the gases, but any sulphur dioxide not present in solution in water will still pass out to the air. Nevertheless, the Cottrell precipitator reduces the visible fumes enormously. The fumes resulting from the concentration of acid by the Simonson-Mantius vacuum process are taken care of by the water jet condenser which furnishes the vacuum for concentration. This is theoretically advantageous, for the reason that the sulphur dioxide is not mixed with a large volume of inert gases before scrubbing is attempted.

The fume nuisance in batch treating of lubricating oil has been eliminated at some points by putting an exhauster on the agitators and leading the fumes to a high boiler stack. Fumes resulting from batch separators may be minimized to some extent by means of steam or water jet condensers, and the amount of sulphur dioxide produced can be reduced materially by separating the sludge as soon as produced.

In the disposal of sludges and sludge residues by burning under boilers and stills, distribution of the operation evenly throughout the day is desirable, in order to reduce the concentration of sulphur dioxide in the air at any one time as much as possible. At one point where "acid coke" was being burned under stills with coal, it was necessary to limit the percentage of this material to 20, or below, in order to reduce air pollution to a satisfactory point.

It should always be borne in mind that the higher the stack and the higher the stack exit temperature, the less chance there is for trouble from these sources. It should also be remembered that it is not the amount but the concentration of sulphur dioxide in the air which leads to complaints from neighbors.

Such complaints are of two kinds. The neighbors may object to the odor of the gas, or gases, and they may claim damage to vegetation. Only a very few parts of sulphur dioxide per 1,000,000 parts of air are required to damage vegetation, and a number of refiners maintain a vigilant patrol of the air of the neighborhood in order to reduce complaints of this sort to a minimum.

### Substitutes for Acid

One way to handle the refinery acid sludge problem is not to make the sludge. A number of substitutes for sulphuric acid have been suggested from time to time, but the majority of these are only auxiliary aids to sulphuric acid in refining petroleum products. Among these may be mentioned materials that depend upon certain absorptive properties for their usefulness in refining operations. Clay, bone char, activated carbon and silica gel are representatives of this class. These materials can either be used in relatively coarse particles in percolation filters or in a finely divided state by the so-called contact method.

Another class of materials suggested as substitutes for sulphuric acid are certain solvents, such as liquid sulphur dioxide, analine and methanol in admixture with certain aromatic hydrocarbons. These materials owe their refining value to their selective solvent action on certain constituents of the oil which are undesirable in the finished product.

The Edeleanu process, which involves the extraction of the aromatic hydrocarbons by the use of liquid sulphur dioxide, is the only one of these that deserves more than passing mention. This process was particularly designed for the production of good burning oils from certain Rumanian crudes, but it is applicable to other products, especially those requiring fuming sulphuric acid for adequate treatment. The Edeleanu process is in use on a commercial scale at a number of points in the United States, particularly on the Pacific Coast, and it is probable that it will fill a definite need in American petroleum technology.

Another type of refining process applied commercially in recent years is the Gray vapor phase clay process. This has been applied commercially both at Mid-Continent and Eastern refineries, principally on cracked gasolines.

Except under very limited conditions, none of the above processes, with the possible exception of the Gray process, make it possible to dispense with the use of sulphuric acid completely. Sulphuric acid still has to do the heavy work in refining, and the sludge disposal problem is like the poor, it is always with us.

## UNCHARTED POTENTIAL PETROLEUM MARKETS

(Continued from Page 117)

the end of 1926 there were 586,000 homes equipped with oil burners consuming an annual average of 50 bbls. per burner, or 29,300,000 bbls. per year. Leod Becker, of the American Oil Burner Manufacturers Association, is my authority that 100,000 new domestic burner installations were made in 1927.

### Oil Burner Market

Late figures estimate that there are 17,600,000 American homes equipped to use electricity. Some definite percentage of these homes, accustomed to the comfort and convenience of electricity, is a prospect for the sale of oil burners. Assume that burner manufacturers can equip even 10 per cent more of them with six-cylinder heat it would add another 88,000,000 bbls. to the consumption figure, or a total of 117,300,000 bbls. going to domestic household uses. Then fancy another 10 per cent increase!

The board of directors of the American Petroleum Institute, at its recent Chicago meeting, said in a resolution, unanimously adopted:

"The modern domestic oil burner gives a kind of household heating service which gas alone has supplied in the past, and in the country as a whole it gives that service cheaper. It is our belief that oil heating will not only supplant gas, which is its present sole competitor, but, like the gasoline automobile, establish a new standard of American home life and fix a level of comfort and convenience never before attained by any civilization, and at a price well below the limit of its economic value for that use."

A multitude of different uses, each consuming relatively small quantities will, in the aggregate, enormously increase product consumption. No potential market is too insignificant to try to chart.

### Not Now a Chemical Industry

The petroleum industry is not now a chemical industry as the term is commonly used, for example, to characterize the coal-tar industry. Coal-tar is used as a starting point in the manufacture of a large number of chemicals, including dyes, explosives, medicines, perfumes and many other groups of wide industrial use. Petroleum, on the other hand, is separated by physical methods, such as distillation, into its various commercial products. In the former case, the chemicals do not exist in the coal-tar but are produced in the manufacturing process; in the latter, the various petroleum products represent "cuts" or "fractions" of petroleum separated from each other by physical method.

This distinction between the two industries falls down in the cracking of petroleum to produce gasoline. This is a chemical process in that the relatively nonvolatile parts of petroleum are changed into more volatile substances. But even this process differs from that of a typical chemical industry in that little is done on the manufacture of pure chemical substances from the products of the cracking operation, greater emphasis being placed on the motor fuel supply.

A beginning has been made in the direction of a new petroleu mindustry, ie., one in which petroleum is used as a raw material for the manufacture of chemicals, and various alcohols, esters and glycols are now being produced. One of these chemicals of interest to the oil man as a consumer as well as a seller of gasoline, is ethylene glycol, a relatively new antifreeze product for use in automobile radiators during the winter season.

No one can forecast exactly what the future has in store with respect to this uncharted potential market, but many chemists agree that its growth will be rapid. Doctor Little, in addressing the American Chemical Society, at Tulsa, in 1926, said, in speaking of the future of the industry:

"Moreover, a new phase, of great significance, now confronts the industry, for petroleum is about to take its place as a raw material of the first importance in the synthesis of organic chemical compounds. It is today the source of numerous alcohols and their derivatives and may soon provide the cheapest base for the synthesis of rubber."

### Insecticide Market

The probable value of California's production of orchard and field crop is said to be around $500,000,000 per annum. If no control measures were taken, the apple, pear, orange and lemon crop would show almost 100 per cent infestation from insects with a possible reduction in value of at least 50 per cent—such a severe loss that the fruit growers there would become bankrupt. Fifteen or twenty million dollars annually are spent out there in insect control.

For 50 years a small quantity of petroleum has been used as an insecticide. From a speech made by E. R. De Ong, of the University of California, at the Institute's Sixth Annual Meeting, at Los Angeles, January, 1926, I learned that experiments had been carried on at the university—experiments which at that moment were in suspense for lack of funds—experiments which, if crowned with success, Mr. De Ong estimated would probably increase the use in California alone of petroleum as an insecticide of from 170,000 to 250,000 bbls. per annum.

If petroleum consumption could be increased several hundred thousand barrels annually as an insecticide in horticulture, is it not reasonable to assume that its use could be more largely extended for mosquito control and the extermination of house flies, cattle flies, poultry lice and all forms of vermin.

Many oil companies are at work attempting to develop new uses and new outlets. Is this work sufficiently intense and continuous? Are there enough companies doing it?

### Co-operative Program

Recently there has been started a movement to develop and finance a co-operative program to seek collectively new and diversified uses for products which could be made from raw petroleum or natural gas. D. E. Buchanan, of Tulsa, a proponent of this idea proposed a resolution, which was adopted by the Institute's board of directors, recognizing the apparent need and desirability of more diversified application of petroleum products. A committee of five directors has been appointed to study and report upon the desirability of the industry undertaking a co-operative program for applied scientific research toward the development of "the uncharted potential market that is waiting."

Harry Frueauff, of the Doherty organization, advocated strongly the idea in a speech before the Institute's marketing group session at Chicago last December. It was enthusiastically received.

The oil trade press has given editorial support to the proposal.

Whether or not the industry is now or will ever be ready to travel the co-operative applied research route in pursuit of uncharted potential markets is beside the question. If the answer should be no, it still does not negative the need or desirability for the conduct of individual and company programs devoted solely to the development of new and diversified markets for petroleum products and the processes for the commercial production of new products for which newly discovered uses may be found. The point is to find markets capable of absorbing the whole contents of the barrel of crude oil.

In my judgment, herein lies a hope for the industry to find relief. In this direction may be found a land of economic soundness where the living waters flow. If we succeed in substantial fashion we can rationalize sales methods and establish sound merchandising company and industry policies.

### Ruinous Competition

Continued ruthless competition and reckless cut-price sales methods do not constitute a sound policy. It is a mere resort either to expediency or desperation. The practice is a terrible eye-opener. It reveals the seamy side of business and makes men cynical and pessimstic. It is merely giving excursion rates for public joy-riding. It is simply staging prize fights for holiday amusement. It can result in no permanent benefit to either merchant or consumer. The practice rarely ever results in moving more of the aggregate production or storage of all oil. When competitors lose their temper, they usually lose also their sense of value and proportion and thereupon engage in a lot of high-handed, high-school heroics. Generally, when the smoke of battle has cleared, it is found that the whole industry has suffered along with the participants in the fight.

In this connection you may find of interest a comment by the Federal Trade Commission. The commission, as directed by Senate Resolution No. 31, adopted June 3, 1926, reported last December to Congress on "Prices, Profits and Competition in the Petroleum Industry." The commission thus pays its respect to the independent jobber:

"Complaints as to unfair competition are not frequently encountered, the independent jobbers being more concerned about price cutters in their own ranks. It is admittedly one of the chief functions of jobbers' associations to keep members from cutting the tank wagon and filling station prices announced by the Standard companies. The Standard companies and the other large companies, when once established in a particular territory, are not complained of much as price cutters."

Intelligent competition is useful and wholesome. It effects business economics. It protects the consumer from unreasonable prices. It makes men experience the thrill of battle. There is nothing that can sharpen a man's senses and develop his power and ability so acutely as for him to know that day after day determined competitors are in pursuit of him.

### Profit the Keynote

It is a serious responsibility to run a business. The key to successful management is profit. One cannot have his cake and eat it. One cannot give away his profit and keep it too. Profit comes through stability in production and manufacture and the pursuit of a sound merchandising policy and sales practice. Stability in production will aid in stabilizing refinery operations. Sounder merchandising policies could be devised and different marketing practices followed if the competition were strongest to chart uncharted potential markets rather than a struggle for a greater share of an old and established market. If you believe in a principle, promote it. The way to promote a principle is to practice it. At any rate, no man should ever shut his mind to any new idea without challenging it with the question "Why not?"

The marketing end of the business is nearest to the ultimate consumer. The marketer has a definite responsibility to help his industry promote and maintain the right sort of public relations. The opinion of a consumer about an industry is formed largely by reading figures of supply and demand or about production, manufacturing, storage or other conditions in the industry and his notion of their relationship to the price he pays for the product—plus distorted stories of

dividends and capitalizations and gushing wells and competitive practices.

The American marketer of oil is part of a great and essential industry serving consumers in every locality and of every class. He ought to be proud of his occupation and his industry and being proud he ought to shout it from the housetops and be ready at all times to defend its character and good repute.

**Give Public the Facts**

A Division of Public Relations is maintained, within the Institute, designed to furnish facts and figures about the oil business and assist the oil companies in correcting misinformation about our business. It invites and needs your help. It can provide you with valuable material for distribution. One of its recent publications, prepared for general public distribution, is a booklet entitled "What Makes The Old Bus Go?" It contains the answer to 65 questions commonly asked about gasoline. Several hundred thousand copies have been distributed already by oil companies.

An automobile owner drives into a Columbus, Ohio, filling station and says "Fill her up." He complains about the price. What does the attendant say in reply? Perhaps, nothing. Probably he grins and shrugs his shoulders.

Would it not be informative and good public relations work if that attendant would say, (translating the idea into his own language), "Ever since the war it has been the persistent boast of the oil industry that among staples largely used and increasingly demanded, none showed such price moderation as gasoline"—and then hand the customer the little A.P.I. leaflet answering the question "What was the cheapest commodity in the United States last year?" This leaflet would show the motorist government figures proving that the petroleum industry has been able, in the face of a roundly 900 per cent increase in gasoline consumption since 1913, to maintain a price level far below other commodity groups and that no commodity has since the war so nearly returned to the prewar price level as has gasoline.

Suppose the price which the Ohio filling station charges the motorist is 19 cents per gallon. Would it be helpful if the motorist knew where his 19 cents goes?

**Analyzing Gasoline Prices**

The competition of Mid-Continent gasoline partly determines the retail price of gasoline in Ohio. Let us assume, for illustration, that the gasoline put into the motorist's auto tank was refined in Oklahoma and shipped by rail to an Ohio marketer who has in turn distributed it to the retail service station. Under such a condition the motorist's 19 cents would be distributed substantially as follows:

| | Cents | Per Ct. |
|---|---|---|
| Ohio state gasoline tax | 3.00 | 15.8 |
| Railroad (for transportation) | 3.56 | 18.7 |
| Wholesale marketer and retailer | 6.44 | 33.9 |
| Oklahoma refiner | 6.00 | 31.6 |

The motorist will observe that 6.56 cents or 34.5 per cent of his 19 cents is a fixed charge over which no oil man has any control. It is fixed by the state and by the railroad. It may go up but it is not likely to come down.

The next "cut" of the 19 cents goes into distribution charges. This figure of 6.44 cents covers the charges for unloading the gasoline from the tank car; storing by the wholesaler; selling, loading, trucking and unloading it to the retail dealer's service station storage tank, from whence it is sold and measure-pumped to the motorist's auto tank. Under the impetus of competition for gallonage and the stimulus to serve the motorist, the investment in marketing equipment and facilities has grown to such enormous proportions that it is extremely doubtful if, taking the country as a whole, the distribution "cut" would show any aggregate net profit for the industry in its distribution operation.

The remaining 6 cents of the motorist's 19 would go to the Oklahoma refiner. He is a manufacturer. He must buy his raw material from a producer. He probably paid $1.38 per barrel of 42 gallons of crude oil to the oil producer whose great investment made possible its discovery and recovery from the underground pool. This crude, when brought to the surface of the ground, had to be stored, then shipped by pipe line, tanker or tank car to the refinery. There the refiner restored it until ready to manufacture it into gasoline and other products. He stored the manufactured products until sold and finally loaded the gasoline into a tank car which belonged either to himself or to the wholesale marketer.

A lot of operations had to be performed before that gallon of gasoline reached the motorist.

**Cost of Crude**

A common error on the part of the complaining consumer, which ought to be corrected, is to assume that a reduction of 25 per cent, let us say, in the price of crude oil should result in an identical reduction in the retail price of gasoline. As explained, the 19 cents paid in Ohio for a gallon of gasoline must cover costs and profits, if any, for the crude oil producer, the pipe line or tank ship or tank car or all, the refining company, the railroad company, the wholesale marketer or jobber and the retail filling station and the state gasoline tax. The crude oil used in making the gallon of gasoline may cost the refiner 2, 3 or even 4 cents. A reduction of 25 per cent in the crude oil price would be a serious thing to the oil producer but it would not affect materially the other items in the list and it would be only a relatively small percentage of the retail price for gasoline.

The public will always be fair to an industry when it knows the facts. Let's give them facts in nontechnical language and with striking illustrations of which we have so many. The opportunity to inform the public of the truth about the oil business is a challenge to every man engaged in the business.

**Trade Associations**

A few words about trade associations and this paper is ended.

Our industrial and national interest requires a certain degree of co-operation between the individuals engaged in a given industry. Other industries have used the trade associations for many years. Within the last few years the trade associations, local, state, group and national, have rapidly developed in the petroleum industry. It has marked a fundamental step in the gradual evolution of our economic life.

The Department of Commerce, at Washington, issues a volume on Trade Association Activities. From Volume 20, Domestic Commerce Series, I quote:

"When a man joins a trade association he cannot anticipate a direct profit return from his investment. His trade association may pay dividends, but not in the usual sense of that word. Further, he must invest in his trade association some of himself as well as some of his money. He or his firm must assume a share of the responsibility for the association's activities, whose effective performance costs not only money but co-operation. This practical kind of co-operation in turn brings him into contact with the other members of his trade association and brings the operations of his business in touch with the operations of their business. * * *

"Information is interchanged, standards of business conduct are set up, market expansion campaigns are undertaken and programs are mapped out for the elimination of waste. The relationships which such activities involve are not the simple relationships of the investor to the corporation in which he has invested."

Are you gentlemen taking counsel and deliberation with your competitors on common problems that are noncompetitive in an effort to avoid the pitfalls of false business steps? Are you availing yourself, through this oil trade association and others, of other men's experience as fully as you might?

When a man gets behind in his drinking and tries to catch up the result is usually a drunken spree and a headachy after-effect. If you are behind in your oil trade association work, try and catch up. You may be intoxicated with the experience but there will be no headache to follow.

This is not an individual but a co-operative age. If you believe in the interdependence of men engaged in the same industry and that the best way to remove hostility, suspicion and distrust is for them to face facts together and pull together instead of pulling apart, get yourself and all your competitors into the appropriate active oil trade associations and promote the principle by practicing it.

Oil has had a profound influence upon the commercial and social life of America. In the early days of the industry, as now, great twisting forces were at work to test the courage and measure the caliber of men in every branch of the business. Constructive courage has been called for at every stage of our industrial evolution and development.

The dark side of the fortunes of the pioneer men in the oil industry, measured in terms of business tragedy and financial hardship, does not tell the story. Considering all the obstacles to be overcome to bring the oil industry to its present stage of efficiency and greatness, the industry today is the monument to its pioneer builders of yesterday. The oil industry of tomorrow will be the monument of its builders of today. May history record it that we were workmen who gave our industry more than a full day's work for a day's pay.

## TRANSPORTATION COSTS REFLECT ON MARKETS

(Continued from Page 112)

western border of Texas As this area is developed the trend will probably be toward building larger and possibly more plants to take care of the increased consumption. This development will necessarily cover a period of many years in the future.

**Wyoming Rates**

Casper, Wyo., is in a less advantageous position from a transportation standpoint because it is not located on water allowing its products to be shipped to coastal points or for export. On the other hand, the small 2-cent zone does not truly represent Casper's position with respect to shipments into distant points. As an example, gasoline may be shipped to Omaha, Neb., for 2.38 cents per gallon while the distance is several times that from Casper to the limit of the 2-cent zone as may be seen on the map.

This gives Casper a larger marketing area than suggested by the 2-cent zone and allows them to ship into the Dakotas, Nebraska and Colorado in competition with other refining centers. Using the example of Omaha, Neb., again, the rate from Casper to this point is 2.38 cents while from Tulsa and Chicago they are 2.18 cents and 2.31 cents, respectively. In the Dakotas, Casper has the advantage in most cases. As an example, the rate to Bismark, N. Dak., from Casper is 4.6 cents and from Tulsa 6.14 cents.

**Water Transportation**

Augmenting the movement of oil by railroads and pipe lines, water transportation stands as an important factor now but its possibilities have probably been realized only to a very small degree as yet. The bulk of the present movement is coastwise, along the Pacific and the Atlantic or from the Pacific and Gulf States to the Atlantic States. Some use is being made of the Great Lakes for the distribution of refined products out of Chicago but as a whole there is very little distribution of refined oils by water throughout the interior of the United States.

With the Mississippi River cutting through the center of the country extending practically the entire distance from near the Canadian border to the Gulf, and navigable for steamboats and tugs as far north as Minneapolis, Minn., a great natural means is already available. Connecting with the Mississippi are several navigable rivers running through densely populated areas. The Ohio River, for example, a tributary of the Mississippi River, passes through the most densely populated portion of the country.

**Mississippi River**

While it is true refineries have been operating on the Mississippi River for years and water transportation has been used to a small extent, it has not been until the last year that a regular service has been placed on a commercial scale on the upper Mississippi and with government aid assured in deeping and widening the channel where necessary a program is underway whereby an adequate number of barges will be placed in service during the next year to take care of any reasonable increase in business. As it comes into greater use its services can be further improved and there is no limit to extent of this development as applied to the movement of oil.

Government engineers have estimated the commerce on the inland waterways in 1928 will be 750,000,000 tons. This, of course, includes all commodities but oil can be made a major commodity. While this estimated tonnage is substantially higher than that actually carried last year it was made after the various programs of development were considered and is termed conservative.

The Missouri barge line from Kansas City to St. Louis will begin to function on a large scale during 1928. Privately owned barges will supplement the government boats on the upper Mississippi River between St. Louis and Minneapolis. The Mississippi now has a 9-foot channel below St. Louis and eventually this will be deepened to allow the larger vessels to come this far north. A canal is proposed linking the upper Mississippi with the Great Lakes.

**Comparative Costs**

To cover the full possibilities of water transportation and the practicability of this type of transportation for the oil industry would require a more involved study but there is no question regarding the cheapness of river transportation compared to rail transportation in general and as a result deserves attention from interior refiners and marketers. No great handicap stands in the way of its adoption by refiners, particularly those operating marketing facilities along the river and this method of reducing marketing costs stands as probably the least studied and yet the most effective of all. Engineers have estimated the cost of transporting a 300,000-gallon cargo of gasoline from St. Louis to Davenport, Iowa, by barge to be .30 cent per gallon while the freight rate amounts to 1.65 cents per gallon. This estimate was based on the cost of towing three 100,000-gallon steel barges each carrying about 350 tons.

Similar savings may be shown elsewhere but each case carries a different set of conditions and where the river transportation is not open during the entire year, either storage facilities must be established at strategic marketing centers along the waters from which the products are distributed by rail or truck, or the system used only during the summer season and shipments made by rail during the balance of the year. Ordinarily the indicated savings in the water transportation will more than pay for the cost of storage and redistribution even for relatively small volumes but of course could not be established on shipments of only a few ears monthly.

While a program of developing this type of transportation might not appear practicable to many refiners, because they do not have refineries already located on a river point a combination of pipe line transportation and water transportation might be worked out. Crude could be piped to river points and refineries established there, the tendency being to give a still wider distribution of the refining centers in keeping with the development of water transportation.

**Tanker Rates**

Water transportation, as applied to the movement of gasoline and crude from California and the Gulf to the East Coast may also be taken as an indication of what might be developed in the

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| 2-TON . . . . $1595<br>6-cylinder engine, 4-speed transmission, 4-wheel brakes (Lockheed Hydraulic). | 1-TON (G-BOY) . $895<br>¾-TON COMMERCIAL . $670<br>*Chassis Prices f. o. b. Detroit* |
| 1½-TON . . . . $1245<br>4-cylinder engine, 4-speed transmission, 4-wheel brakes (Lockheed Hydraulic). | ½-TON PANEL DELIVERY CAR $770<br>*(Complete with body f. o. b. Detroit)* |

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# Time-Tried and Tested

# Powell Valves

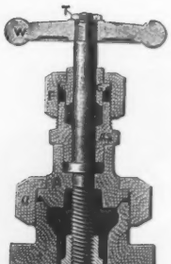


*FIG. 178—S.E. Bronze Hydraulic Gate Valve. 2,000 pounds W.W.P. Sizes ½ to 3 inches.*

POWELL Valves in design, construction, and service have taken the same place in the oil fields as other Powell Products have taken as standards in engineering and industrial practice for 82 years.

POWELL Design, construction, accurate processing, and positive testing insure uniform products.

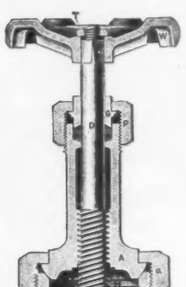

*FIG. 375—S.E. Bronze White Star Gate Valve. 200 pounds W.S.P. and X. Hvy for 300 pounds W.S.P. Sizes ¼ to 3 inches.*

POWELL Valves are especially adapted for oil and gas well, field and refinery service. They are processed to be oil and vapor tight.

POWELL Gate and Globe Valves are obtainable with seat faces especially ground for handling gas, gasoline, and other volatile liquids.

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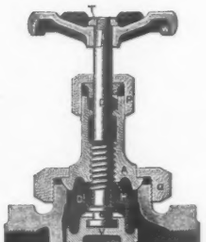


*FIG. 190—S.E. Iron Body Irenew Globe Valve. 150 pounds W.S.P. and X. Hvy for 300 pounds W.S.P. Sizes ¼ to 3 inches.*

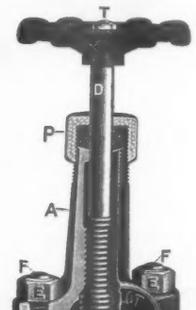


*FIG. 460—S.E. Iron Body Pilot Gate Valve. 125 pounds W.S.P. Sizes ¼ to 3 inches.*

## Republic Supply Company

GENERAL OFFICES - HOUSTON, TEXAS

OIL AND GAS WELL SUPPLIES

ROTARY AND CABLE TOOLS

interior. Gasoline is carried all of the way from the California refineries through the Panama Canal to Atlantic Seaboard points for 1.4 cents to 2.3 cents per gallon, depending upon the available tankage. The movement of this material over land would be out of the question. Even the movement of gasoline from the Gulf to the Atlantic ports as far south as Savannah, Ga., and Charleston, S. C., and the redistribution of the gasoline from these points in the southeast, has been practiced in competition with shipping material by rail from New Orleans and other Gulf refining points into this territory.

The water rates from the Gulf to Charleston vary over a period of a year, depending upon the amount of empty tankage available but rates are very rarely more than three-quarters of a cent per gallon and at present are about .4 cent per gallon.

This low rate is indicative of the rate structure on other coastal shipments at present but may be considered abnormally low over a period. This is due to the seasonal slump in the consumption of oils and the increased amount of empty tankage. Rates on crude are low also. California crude may be moved to the Bayonne refining center and other Atlantic points for 55 cents a barrel and possibly a few cents less in some cases. Crude shipped from the Gulf Coast takes equally low rates at present. These range from 18 cents to 20 cents a barrel now but ordinarily these rates will range between 35 cents and 38 cents a barrel.

Of course this does not represent the total cost of transporting the crude to the Atlantic Seaboard refineries for there is not sufficient crude produced in the Gulf Coast area to supply other sections and the bulk of the crude comes from the fields in Oklahoma and North Texas. The pipe line rate from the Mid-Continent to Houston is 35 cents a barrel but does not include a gathering or storage charge. At this, a brokerage charge is made in addition, so the cost, including the tariff, and these charges will approximate 65 cents a barrel.

Offhand, it would seem that the movement of crude from California to the Atlantic refineries at 55 cents a barrel plus a gathering charge, would be cheaper and would eliminate the shipping of Mid-Continent crude by way of the Gulf. But there is another factor to consider, that being the relative values of the two crudes from a refining standpoint. The Mid-Continent crudes are generally of a higher gravity and yield a correspondingly higher percentage of gasoline than the California crude and when gasoline prices are relatively high compared with fuel oil, the Mid-Continent crude might yield a greater refinery revenue than the California crude even after paying the higher transportation cost.

Similarly, the advantage in freight rates Chicago refiners have over the Mid-Continent refiners in the thickly populated territory, including Illinois, Indiana, Ohio, Michigan and Wisconsin is not a net savings, for the cost of transporting crude from the Mid-Continent materially reduces the margin of difference. The tariff on crude piped from Oklahoma and Kansas to Chicago is 47 cents and in addition the total cost will include a gathering charge of about 20 cents and a brokerage charge of 10 cents. This will make the total delivery cost 77 cents per barrel. This cost, however, is based on the published tariffs rather than the actual operating cost of transportation which in turn may be more or less depending upon the amount of oil transported.

A summary of these data is contained on the map accompanying this article and includes the freight rates from the various refining centers to major marketing points, the tanker rates on the coastwise movement of gasoline and crude oil and the pipe line tariff on crude carried in lines linking the Mid-Continent and Wyoming producing fields with the Chicago, Gulf and Bayonne refining centers.

## DISTILLATION WITH MODERN PIPE STILL

(Continued from Page 100)

which the operator desires to control the tower.

The air-actuated controls fall into three classes, depending on the type of filling of the capilliary tubes, each of which has its advantages and disadvantages. These three classes are: mercury-filled, vapor-tension and gas-filled instruments. As a class, the advantage is that as soon as the temperature is transmitted to the regulator, the reflux is brought into balance with the tower conditions. The controlling factors are the sensitivity of each type of instrument from a theoretical point of

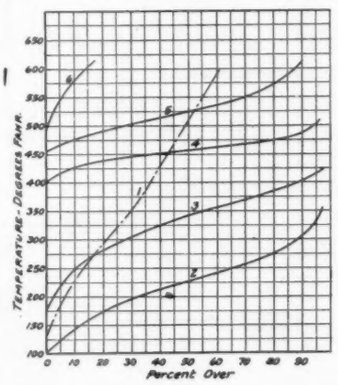


*Figure 9—Engler distillations of products, Foster still No. 4, Marland Refining Co. 1, crude, 39.9 degrees Baume; 2, overhead, tower A, export 64.5 degrees Baume; 3, overhead, tower C, Navy 53.5 degrees Baume; 4, kerosene distillate 41 degrees Baume; 5, gas oil, 36.7 degrees Baume; 6, residuum, 25.4 degrees Baume.*

view, and the location of the instrument from a practical point of view.

It is claimed that the mercury-filled instrument is the most sensitive as well as the most rugged type. It requires short tubing lengths and therefore has the disadvantage of having to be located near the point of control.

The vapor - tension instrument is claimed to be as sensitive as the mercury-filled instrument, over a comparatively small range. The disadvantage is that it is necessarily limited to a smaller range of settings than the mercury-filled instrument; however, the length of tubing may be longer, so that the location of the instrument may be more variable than that of the mercury-filled controller.

The gas-filled instrument, according to instrument manufacturers, is not as sensitive as the mercury-filled or the vapor-tension instrument It does, however, lend itself to greater flexibility from a practical standpoint, in that it may have as long a capillary tubing as the vapor-tension instrument and may be of the direct-set type operating equally well over a wide range of temperature settings.

When the tower temperature is to be regulated by air-actuated controls while pumping reflux into the tower, it is well to combine a pressure regulator with the temperature regulator in order that there may be a fluid pressure ready to release the reflux liquid at the instant the control valve opens.

Although straight-line control is theoretically the most satisfactory, a variation of ±2.5 degrees Fahrenheit is well within reason for all practical purposes and may be accomplished with either pyrometer or air-actuated controls. The type of instrument to be installed can be determined only for the particular job under consideration; for example, if remote control is desired, the pyrometer controller is the most satisfactory; if simplicity of equipment is the outstanding need, the air-actuated controller should be installed.

Whether air-actuated or pyrometer controls are used, a by-pass line should be provided through which a certain amount of reflux may be passed continuously. Thus the control valve will be required to pass only the variable amount of reflux to take care of temperature changes.

### Flow Sheet of Towers

The difficulty of obtaining side streams to specifications was previously discussed. It was shown that the overlap of distillation curves of adjacent plates was excessive. Effective separation is possible only between the top and the bottom products of any one tower. This is in effect an argument in favor of multiple towers. Consider such an arrangement as shown by Figure 3. Tower 1 effects a separation between fuel oil and all other products. The introduction of steam to lower the vapor pressure and hence create a reboiling effect is necessary on this tower, since there is no product hotter than the fuel oil to give up heat.

Gas oil, kerosene and gasoline vapors enter tower No. 2. Here only the gas oil is removed, the other two passing as vapor to tower No 3 where final separation between kerosene and gasoline is made. In towers 2 and 3 there is available material at a higher temperature, the heat of which may be utilized for reboiling the material removed as liquid from the bottoms. The number of plates, tower diameter, etc., may be varied to meet conditions.

### One Column

Now consider that one column will take the place of all three; assuming, of course, that the total number of plates will remain the same. Refer to Figure 4. The overhead vapor cut will correspond to that from tower 3 of Figure 3. At some plate A there will be a lquid whose highest boiling point will correspond to that desired for the end point of the kerosene. It will, however, contain light ends belonging to the gasoline series. Therefore it must be redistilled in a separate column with the application of heat from some source. The same is true of the gas-oil fraction. It would be equally possible to take liquid from a plate lower than A whose initial boiling point is at the end point of gasoline. This stream could be led to a side column and refractionated, so that the vapors evolved would form the kerosene cut, which would be led away and be condensed while the bottoms would reflux back to the main column.

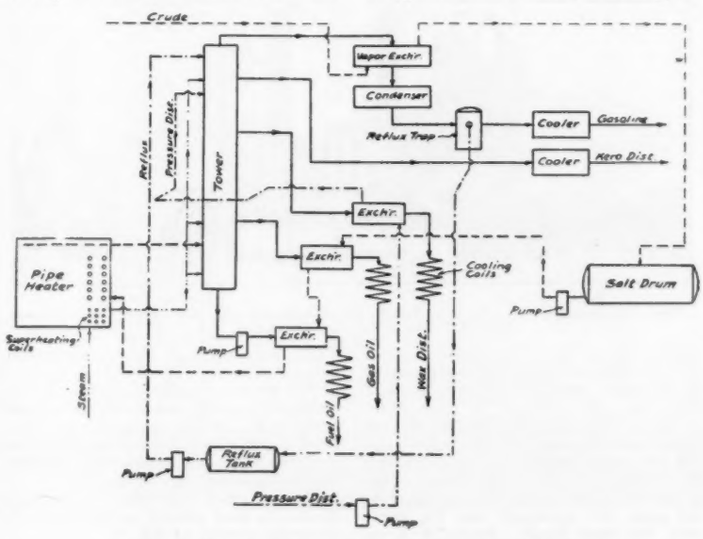


*Figure 10—Flow chart, Foster still No. 5, Marland Refining Co.*

It is unnecessary that these small auxiliary columns should be outside the main tower. Their function is accomplished by the various proprietary so-called "stripping" sections located sometimes within the tower itself. The efficiency of the tower, as far as absolute separation of products is concerned, is, however, dependent on the care and judgment used in the design of these sections.

Consider further the fact that the greater the difference in boiling points between two products, the easier is the separation in any given tower. For instance, the mean boiling point of gasoline, say, is 275 degrees, and of kerosene 490 degrees, a difference of 215 degrees. This separation is easier of accomplishment than that of kerosene from gas oil, with

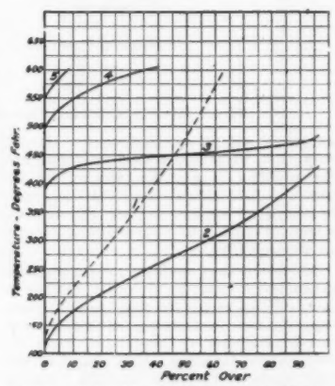


*Figure 11—Engler distillations of products, Foster still No. 5, Marland Refining Co. 1, crude 40.7 degrees Baume; 2, gasoline 58.2 degrees Baume; 3, kerosene distillate 41.5 degrees Baume; 4, gas oil, 35 degrees Baume; 5, residuum, 24.5 degrees Baume.*

a mean boiling point around 600 degrees, and the difference only 110 degrees. Likewise, the clean separation of gas oil from fuel oil is harder because the boiling points of these two products are still closer together. Therefore, as a general statement, the further we go into the crude the more difficult is the separation of successive cuts. Fortunately, very few refiners are interested in close cuts by boiling points after gasoline and kerosene are finely separated. The end point of kerosene is of little interest, if gravity and color are satisfactory. Of even less interest is the separation between gas oil and fuel oil.

When we come to the fractionation of the overhead products from a crude being run to cylinder stock, the separation of the heavy ends is of great importance. If any wax distillate or gas oil is left in the cylinder stock, the established flash, fire and viscosity relationships are altered, and the dewaxing problem is complicated. Likewise, the presence of cylinder stock in wax distillate is detrimental to wax removal by cold pressing. In the present state of the art, the more conservative method of effecting the final separation between wax distillate and stock is to remove only a portion of the distillate in the once-through pipe still and then use other apparatus. Batch stills or circulating pipe stills can be used. The series pipe still also appears to have possibilities.

### Complete System

In general, pipe stills may be divided into three distinct types: (1) the "once-through" or single-flash; (2) the series pipe still, where two or more are operated in series; (3) the circulating pipe still.

The first is the most popular and has the broadest field. With a properly designated single column or multiple towers, separations to meet specifications of all

light products can be made with excellent yields and cost figures. For heavier products the separations are satisfactory as far as gas oil and fuel oil are concerned. It appears to have limitations when cylinder stock is the desired residual product.

The second type, in which two pipe stills are operated in series, presents two advantages. In this case, the volume of cuts removed in vapor phase is greater than in the case of the single-flash unit, therefore the possibilities of vapor heat exchange are greater. Secondly, if close separation of residuum from the next heaviest product is desired, a second simple tower will give better results. It will only have to separate two products, and the problem is not complicated by the partial vapor pressures of all the superheated light vapors passing through the tower. Figure 5 is diagrammatic of such an arrangement.

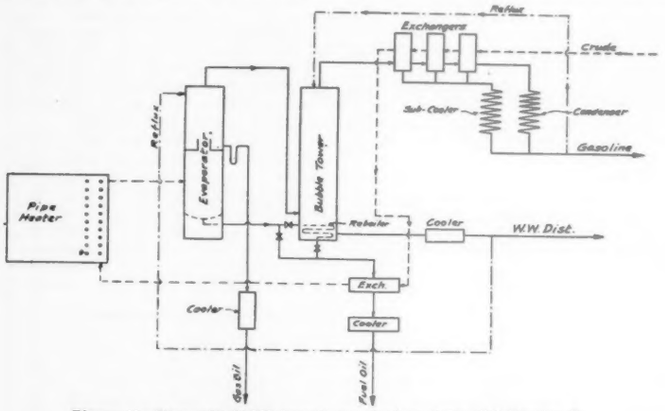


*Figure 12—Pipe still (2,000 barrels per day) at Aetna Oil Service Co.*

It is said that such an arrangement is expensive to construct. As a matter of fact, careful estimates show that the savings in heat-exchanging equipment and smaller-diameter towers about offset the cost of two furnaces. Criticism has also been made of the high flue-gas temperature at the outlet of the second unit. This hot flue may be passed to the first unit and used to dilute the products of combustion at that point. Little has been done on commercial installations of this type, but it is believed that there are inherent advantages which should receive more attention. Particularly is this true where close control of bottom products is desired.

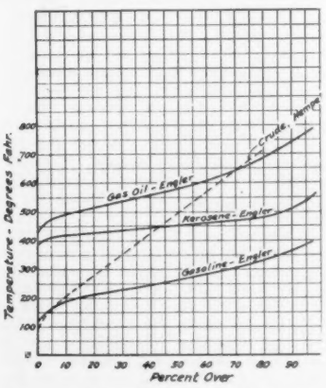


*Figure 13—Pipe-still results for May, 1927, Aetna Oil Service Co., Louisville, Ky. Yields: gasoline, 40.79 per cent; kerosene, 6.77 per cent; gas oil, 30.78 per cent; 20-22 fuel oil, 21.03 per cent; loss, 0.63 per cent.*

The circulating type of pipe still is in reality a batch still with an independent means of supplying the heat. While the addition of a circulating tube nest to a batch still will not in itself greatly improve the fuel efficiency of such a unit, it will eliminate the possibility of hot spots on the still bottom. As the oil increases in temperature, flue-gas temperatures must also rise, accounting for the poor efficiency as compared to the once-through or single-flash unit.

However, one advantage is inherent in any batch operation and that is close control of the residual product. To bring up the efficiency of the circulating type of still, the diagram (patents pending) of Figure 6 is submitted. This is in effect two batch stills, separators 1 and 2, connected to one pipe heater. Consider No 1 as operating on the heater. No. 2 may be used as an accumulator of heat by feeding the crude over the exchangers. By the time No. 1 is off, there is a batch of hot stripped crude in No. 2. The heater is then connected to No. 2 and No. 1 is pumped out to serve as the accumulator for the next batch. The flow of crude on the next cycle is not shown on the diagram but is reversed in direction and goes into No. 1. The temperatures through two cycles from actual operation are shown by Figure 7.

From actual runs, the fuel required for such a unit has been demonstrated to be between 10.5 and 11 pounds of coal per barrel, or about 2.4 per cent oil equivalent when running Pennsylvania crude to cylinder stock. This compares quite well to the efficiency of single-flash units.

The principal advantages of the arrangement are close control of bottoms coupled with good fractionation and overall fuel efficiency. Its disadvantages are a higher steam consumption and limitations as to size. The maximum for one unit is about 1,500 bbls. daily capacity.

### Typical Examples

Figure 8 is a diagram respectively of No. 4 Foster still at the plant of the Marland Refining Co. It is of the single-flash multiple-tower type. The heater consists of a Power specialty furnace with an effective length of 3,334 feet of 4-inch tube. Badger towers are used. The first, marked A, is a flash drum where the gasoline evolved in the exchangers is removed as an export cut having 350 degrees to 400 degrees end point. The temperature of the flash drum is determined by the amount of hot oil from the pipe still by-passed into the drum with the fresh crude. Tower B is an evaporator for the pipe still and C is the final fractionating column.

The crude circuit is first over the partial condensers, where it reaches a temperature of 220 degrees. It then goes to a salt drum, from which it passes over residual exchangers and is raised to 250 degrees before entering the flash tower A. Enough hot oil from the heater enters with the fresh crude to bring the temperature in the flash drum up to 370 degrees. The oil is then pumped from the flash drum A through the tubes of the still, is raised to 550 degrees and enters the evaporator.

The bottoms from tower B are pumped into a stripping section at the base of tower C, where they furnish heat for reboiling the bottoms from C. One top stream of gasoline and side streams of kerosene and gas oil are removed from C. This unit has a capacity of 7,000 to 10,000 bbls. per day. Figure 9 shows the distillation curves of products. When removing 75 per cent of distillates from the crude, a fuel consumption of 1.4 per cent is reported.

Figure 10 is a diagram of Foster still No. 5 also at the plant of the Marland Refining Co. This is also a single-flash unit with the fractionation accomplished in a single column. The furnace and tower are both of Power Specialty Co.'s design. The furnace is the same as that just described. The tower is 10 feet 6 inches in diameter and 76 feet 6 inches high. This unit has a skimming capacity of 10,000 bbls. daily. When running to 11 per cent cylinder stock bottoms, the capacity is reduced to 5,000 bbls. and is intermediate for other proportions of overhead. The fuel consumption is 1.5 per cent for 26.5 per cent bottoms, and 2.4 per cent for 11 per cent cylinder stock bottoms.

This tower is controlled entirely by the "pump-in" system, no partial condensers being used. When skimming, both finished gasoline and pressure distillate are used for reflux. When running to stock, finished gasoline only is used with a reflux ratio (gasoline returned to the tower divided by final amount of gasoline taken from the system) of 3.5.

In this tower the stripping sections are integral and the reboiling effect is accomplished by the use of steam. Figure 11 shows the distillation curves of the products.

A smaller unit with less refinement is shown by Figure 12. This is installed at the plant of the Aetna Oil Service Co. at Louisville, Ky. It has a daily capacity of 2,000 bbls. A Foster heater and towers of the writer's design are used. Results are shown by Figure 13, which are the average for May, 1927. The fuel consumption over the same period, when running to 21 per cent bottoms, was 2.15 per cent and has been reduced somewhat since.

Figure 14 is a photograph of a pipe still designed and built by the M. W. Kellogg Co. for the Simms Oil Co. at Smackover, Ark. The furnace is of the radiant-heat type, eight corborundum tunnels being used. The coil consists of 4-inch tubing with an effective surface of 6,600 square feet. The unusually large amount of surface is accounted for by the purpose of the design, which called for the maximum gasoline yield from heavy Smackover crude, coupled with bottoms that could be sold as commercial fuel. By operating under some back-pressure and utilizing some of the excess surface as a soaking section, the desired results are attained.

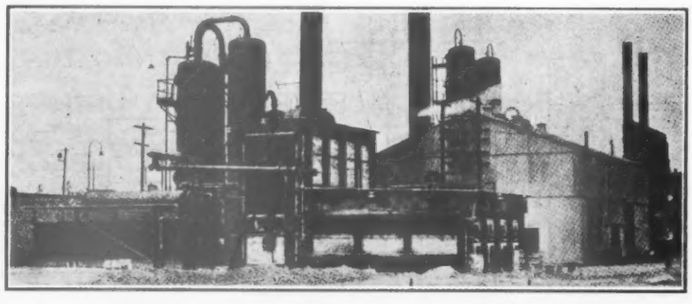

*Figure 14—Radiant-heat pipe still (2,500-barrel) designed and built by M. W. Kellogg Co. for Simms Oil Co. at Smackover, Ark.*

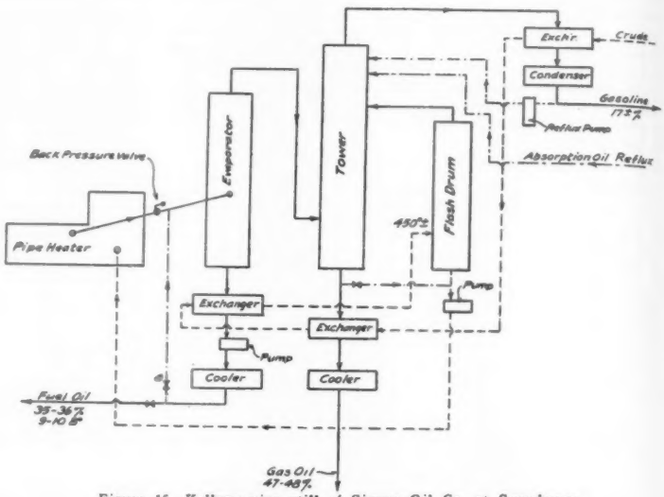


*Figure 15—Kellogg pipe still of Simms Oil Co. at Smackover.*

The unit has a daily capacity of 2,500 bbls., removing 17 per cent of gasoline and 47 per cent of pressure-still charging stock.

Figure 15 is a self-explanatory flow chart, the results being shown by Figure 16.

An unusual pipe-still installation is shown diagrammatically by Figure 17.

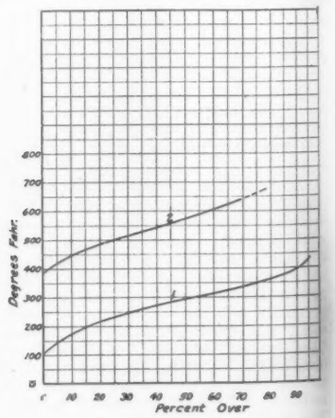


*Figure 16—Simms Oil Co. pipe still results, Smackover refinery. Crude 20.4 degrees Baume Smackover: 1, gasoline, 53 degrees Baume; 2, gas oil, 27 degrees Baume; bottoms, 9.8 degrees Baume; 585 furol at 122 degrees.*

This unit is one of two installed at the Petty's Island refinery of the Crew-Levick Co. In all other examples given, the tower control is accomplished by either refluxing or pumping in a portion of the final overhead condensate. In this unit, the vapors of each tray are partially condensed and returned as reflux.

There are six bubble trays and six interchangers, one for each tray. The crude going to the unit is in the body of the interchangers around the tubes. The ad-

# RECENT BADGER BUSINESS

AS illustrating the variety of equipment furnished by us, we are listing herein different types of installations for which orders have been placed with us during the last five months.

Complete installations including Pipe Heaters and Fractionating Systems for Topping, Vacuum Distillation of Lubricating Oils, Reduction of Pressed Distillates and Distillation of Pressure Distillate.

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Continuous Fractionating Units of Badger Double Column Type for a variety of Crudes. Three of these units have a capacity of 15,000 barrels per day each.

Fractionating Equipment for Shell Still Batteries, for Vapor Phase Gasoline, and for Natural Gasoline.

*The following Companies are some of those who have purchased BADGER Equipment:*

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Anglo-Persian Oil Co., Ltd.
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Associated Oil Co.
Barnsdall Corp.
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Tidal Refining Co.
Standard Oil Co., of N. J.
General Petroleum Corp.
Beacon Oil Company
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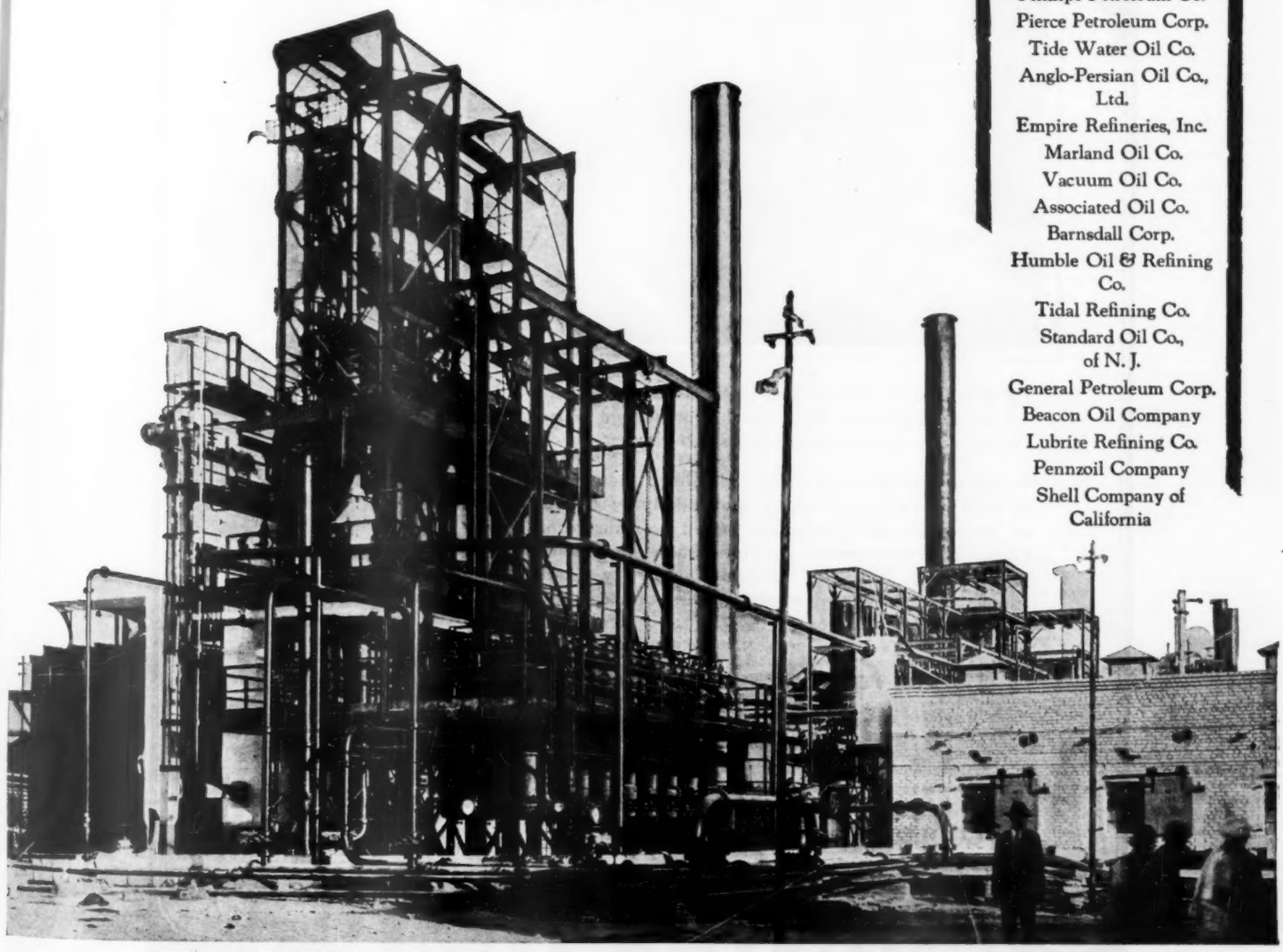

# E. B. BADGER & SONS COMPANY

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# Pumps for the Oil Industry

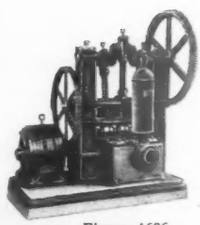

Figure 1696
*Goulds Single-Acting Triplex Pump*

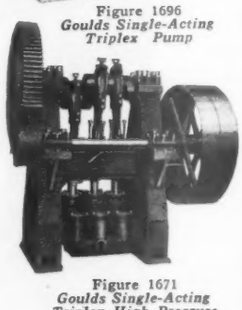

Figure 1671
*Goulds Single-Acting Triplex High Pressure Pump*

THE Goulds Centrifugals shown in the above illustration have been on active duty at a large Wilson, Oklahoma, petroleum plant since 1926.

Pumping requirements in the petroleum industry are unusually exacting—24 hours service daily—wide range of fluids handled—extremely varied working conditions. Engineers desiring to meet these requirements satisfactorily, will not hesitate to specify Goulds Pumps; for 80 years, manufacturers of dependable pumps for every purpose.

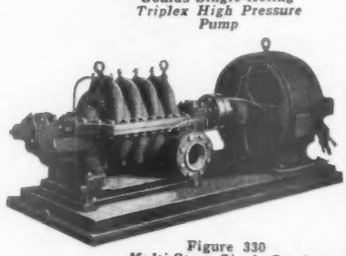

Figure 330
*Multi-Stage Single Suction Centrifugal Pump*

## *Send for These Bulletins*

*Accurate and useful data on the adaptability of Goulds Pumps for the oil industry in Bulletins 126 and 130, compiled by Prof. Robert L. Daugherty; "Petroleum Industry and Pumps Used," printed by Lefax. Mailed upon request.*

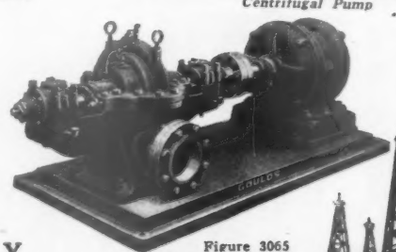

Figure 3065
*Single Stage, Double Suction Centrifugal Pump*

**GOULDS PUMPS, Inc., Seneca Falls, N. Y.**

**GOULDS PUMPS**

ditional four interchangers are used only as heat exchangers. There are three sets of tubes in each of the 10 interchangers. Vapor is in one, hot gas oil in the second and hot residuum in the third. The principle of the design is to maintain a low temperature differential between the vapors from any one tray and the crude in the interchanger of that tray. The temperature of the crude is controlled by by-passes around the interchangers in the hot fuel-oil circuit. Thus the amount of reflux bled back to the tower is determined. Once the temperatures are established, a balanced condition is reached which requires very little attention. No automatic controls are used.

Note that only one overhead cut is taken from the tower The bottom product is water-white distillate and gas oil combined. This is led to an auxiliary vessel, termed extractor. By means of open steam coupled with heat from the fuel oil from the evaporator section, the kerosene is removed. The gas-oil bottoms then enter the exchanging system as described above.

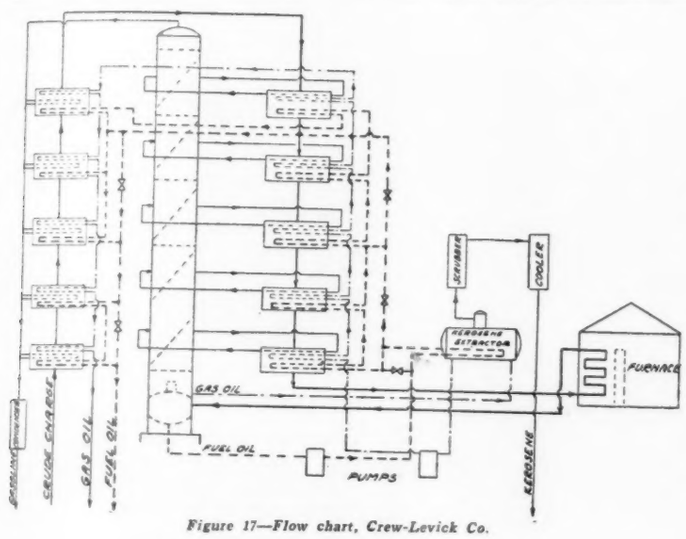


*Figure 17—Flow chart, Crew-Levick Co.*

As might be expected from such a complete exchanging system, the crude enters the pipe still at a very high temperature, 500 degrees to 510 degrees being the usual figures. The pipe heater itself is, therefore, relatively small. The fuel consumption is exceptionally good, 1.4 per cent being reported for an overhead of 60 per cent. The distillation curves of the products are shown by Figure 20.

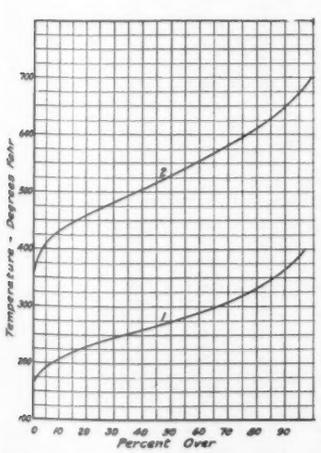


*Figure 18—Engler distillations, Crew-Levick pipe still. 1, overhead gasoline; 2, tower bottoms (kerosene and gas oil).*

**Acknowledgments**

The author appreciates the co-operation of the Marland, Simms and Crew-Levick Oil Cos., without whose permission much of the data herein given could not have been released.

## ANALYSIS OF PRESENT FUEL OIL SITUATION

(Continued from Page 114)

under a general heading which includes all classes of gas oil and fuel oils.

Of the volume of all fuel oils in storage east of the Rockies, about two-thirds is held in regions bordering on the seaboards. This proportion has been almost constant for the past two years.

**Conclusions**

It is evident that the sales of fuel oils must be accelerated until they can keep pace with the other petroleum products. An increase in gasoline and kerosene sales would accomplish the same result to some extent through the elimination of some of the fuel oil by cracking. The possibilities for appreciably increasing the sales of these products does not appear to hold out as much promise as does the field of possible increase of fuel oil sales. The recovery of former fuel-oil customers would furnish an outlet for a large volume now without a market.

Real sales effort will be necessary in order to sell fuel oil in competition with other fuels. More attention will have to be paid to external competition and less attention to intensive competition within the industry.

It may be necessary to resort to research for new uses for petroleum products in general and fuel oils or the heavier oils, in particular. The industry has been out of balance since its inception, through having one product which was considered as the principal product. Kerosene was the first "principal product." Later gasoline took its place. During the past year or more, the tide has swayed between gasoline and fuel oil. The industry will never reach stability until there is a balance of demand for all petroleum products. The industry should accelerate the approach of this balance by research into new uses.

Better balance could be obtained under present conditions by proper regulation of outputs and by proper merchandising. By "proper merchandising" is meant a proper re ation between price and output in order to bring a close balance of the volume of sales of the various products. Proper merchandising also means a proper attitude toward the relation of the price of crude stored to cover contracts and the price of refined products sold under these contracts.

The industry is severely handicapped by a lack of more detailed fuel-oil statistics. The problem of marketing the current output of fuel oil and of reducing the present large stocks is a very serious one. The need of accurate and detailed statistics covering fuel oils is evident.

# CONDUCT TESTS TO DETERMINE REFINING VALUE OF ROD-WAX

By F. E. Wood[1], H. W. Young[2], and A. W. Buell[3]

This paper summarizes the results of laboratory tests conducted to determine the properties of the paraffin or rod-wax encountered in the Salt Creek Field, Wyoming. It also describes field tests and methods employed to cope with the paraffin problem. The conclusions to be drawn from the laboratory work are:

1. Samples of Salt Creek paraffin range in consistency from soft to hard, the melting points varying from 120 degrees to 156 degrees.[4]

2. Masses of soft paraffin are soluble to an appreciable extent in crude oil and its liquid fractions at temperatures somewhat below the melting point of the paraffin. Hard paraffin is very slightly soluble under these conditions.

3. Agitation apparently increases the amount of paraffin which will go into solution.

4. Paraffin congeals from solutions upon cooling to the point of saturation, which is in all cases below the melting point of the paraffin.

5. Crude oil is the most effective of all the solvents for holding paraffin in solution.

6. Pressure alone does not appreciably affect the solubility of paraffin in crude oil nor does it aid materially in holding paraffin in solution when the temperature is reduced.

7. Natural gas in solution under pressure does not appreciably increase the solubility of paraffin in crude oil, but is effective in holding paraffin in solution when the temperature is reduced.

8. A foreign body introduced into a solution of paraffin in oil is immediately coated with paraffin if the temperature of the solution is at or below the melting point of the paraffin, and the object is considerably cooler than the solution.

In this paper we have stated that paraffin is taken into solution. This may be a questionable use of the term, as it is possible that the paraffin may be in suspension rather than in solution.

The object of the laboratory investigation was to determine the conditions favorable for dissolving paraffin and for preventing its deposition from crude oil.

**Difference in Samples**

As noted in the first conclusion samples of Salt Creek paraffin were found to grade from soft to hard. Soft paraffin contains a considerable amount of oil whereas hard paraffin has suffered loss of oil by evaporation and drainage.

Compact masses of paraffin grading from soft to hard were placed in beakers containing gasoline, kerosene, naphtha, crude oil, and mixtures of these liquids, and maintained at temperatures varying from 50 degrees to the melting points of the paraffin for intervals varying from 1 to 24 hours. The amount passing into solution was measured by weighing the samples before and after treatment. Below 100 degrees no measurable solution occurred. Above that temperature the soft paraffin began to dissolve to some extent, and were appreciably soluble at temperatures somewhat below their melting points. No weighings were made in tests in which the temperature exceeded 100 degrees as the masses of paraffin softened and in part disintegrated. The samples of hard paraffin did not disintegrate and dissolve appreciably except at temperatures only slightly below their melting points.

No quantitative tests were made to determine the effect of agitation. Agitation would undoubtedly increase the tendency of the masses of paraffin to disintegrate, thus exposing more surface to the solvent.

A series of solutions containing 5, 10, 15 and 25 per cent by weight of paraffin in crude oil were prepared by heating to temperatures above the melting point of the paraffin and allowed to cool. At 100 degrees practically all of the 25 per cent solution and over 40 per cent of the 15 per cent solution had congealed. At this temperature there was only a slight deposition in the 10 per cent solution and none in the 5 per cent solution. Dropping the temperature to 60 degrees increased the deposition somewhat in the 10 per cent solution and caused a slight deposition in the 5 per cent solution. Parallel tests with the other solvents proved that these were not nearly as effective as crude oil for holding paraffin in solution.

Tests were made to determine the effect of mechanically applied pressure upon the solubility of paraffin in oil and also the effect on the capability of the oil for retaining the paraffin in solution. A ball of paraffin was introduced into crude oil and a pressure of 250 pounds applied. After standing under pressure at 100 degrees for several hours the paraffin ball was removed and found to have lost no weight.

**Tests Described**

A series of oil samples containing 5, 10, 15 and 25 per cent of paraffin were prepared and a pressure of 250 pounds applied to all except the latter, which congealed too rapidly to permit its being introduced into the pressure apparatus. The container filled with the sample, was so placed that it could be emptied without reducing the pressure, by inverting the apparatus. The apparatus was cooled to 100 degrees, inverted, opened, and the amount of congealed paraffin remaining in the container was found to be the same as in the corresponding tests at atmospheric pressure.

Other experiments were performed to determine the effect of natural gas dissolved in oil under pressure on the solubility of paraffin. A ball of paraffin was placed in oil saturated with gas at a pressure of 160 pounds and maintained for several hours at a temperature of 100 degress. The paraffin ball, upon removal, showed no loss in weight, indicating that no solution had occurred.

Another series of oil samples containing 5, 10, 15 and 25 per cent of paraffin were prepared. These were saturated with gas at a pressure of 160 pounds while heated to a temperature sufficiently high to insure that all paraffin was in solution. The beaker containing the solution was held in such a way that the apparatus could be shaken to facilitate the absorption of the gas without emptying the beaker. The solutions were then cooled to 100 degrees and permitted to stand under pressure for several hours. The apparatus was inverted to permit the uncongealed solution to flow from the beaker while saturated with gas under pressure. Upon opening the apparatus it was found that the 5 and 10 per cent samples showed no deposition of paraffin in the beaker, while the 15 per cent sample showed only a very light deposition. The 25 per cent solution showed only a light deposition and did not solidify until most of the dissolved gas had escaped. Comparing these results with those in which no dissolved gas was present proves conclusively that dissolved gas aids in holding paraffin in solution.

An interesting feature brought out in these experiments was that any foreign body as a thermometer, glass rod, or a piece of pipe, if at a temperature considerably lower than the oil, was immediately coated with paraffin when introduced into the oil samples containing the higher percentages of paraffin, provided the temperature of the oil was not higher than the melting point of the paraffin. This property, together with the loss of gas from solution, helps to explain the deposition of paraffin in tubing, flow lines, etc.

**Results of Experiments**

In the Salt Creek Field various tests and methods have been tried to relieve paraffin deposition in oil wells and flow lines. The zone of maximum paraffin

(Continued on Page 156)

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[1]Petroleum Engineer, the Midwest Refining Co., Casper, Wyo.
[2]Research Engineer, the Midwest Refining Co., Midwest, Wyo.
[3]Research Engineer, the Midwest Refining Co., Midwest, Wyo.
[4]All temperatures are given in the Fahrenheit scale.

# Government Preliminary Report for 1927

## ANALYSIS OF SUPPLY AND DEMAND OF ALL OILS

(Including wax, coke, and asphalt in thousands of barrels of 42 U. S. gallons)

| | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. | 1927 | *1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEW SUPPLY: | | | | | | | | | | | | | | |
| Domestic production: | | | | | | | | | | | | | | |
| Crude petroleum | 71,475 | 67,874 | 75,304 | 72,590 | 76,275 | 74,538 | 78,333 | 77,998 | 75,081 | 77,081 | 73,778 | 74,108 | 894,435 | 770,874 |
| Natural-gas gasoline | 3,145 | 2,933 | 3,271 | 3,172 | 3,219 | 3,093 | 3,119 | 3,214 | 3,245 | 3,419 | 3,410 | 3,512 | 38,752 | 32,986 |
| Benzol | 217 | 200 | 226 | 216 | 221 | 210 | 214 | 214 | 210 | 217 | 205 | 212 | 2,562 | 2,111 |
| Total | 74,837 | 71,007 | 78,801 | 75,978 | 79,715 | 77,841 | 81,666 | 81,426 | 78,536 | 80,717 | 77,393 | 77,832 | 935,749 | 805,291 |
| Daily average | 2,414 | 2,536 | 2,542 | 2,533 | 2,571 | 2,595 | 2,634 | 2,627 | 2,618 | 2,604 | 2,580 | 2,511 | 2,564 | 2,206 |
| Excess of daily average domestic production over domestic demand | 425 | 485 | 437 | 466 | 455 | 378 | 425 | 224 | 204 | 367 | 355 | 199 | 368 | 69 |
| †Imports: | | | | | | | | | | | | | | |
| Crude | 4,514 | 4,181 | 4,434 | 4,063 | 4,557 | 4,019 | 4,824 | 6,261 | 5,122 | 4,633 | 5,339 | 6,209 | 58,156 | 60,283 |
| Refined | 1,189 | 1,508 | 1,027 | 1,201 | 1,329 | 1,448 | 1,053 | 774 | 868 | 1,041 | 1,159 | 755 | 13,352 | 20,338 |
| Total new supply all oils | 80,540 | 76,696 | 84,262 | 81,242 | 85,601 | 83,308 | 87,543 | 88,641 | 84,526 | 86,391 | 83,891 | 84,796 | 1,007,257 | 886,611 |
| Daily average | 2,598 | 2,739 | 2,718 | 2,708 | 2,761 | 2,777 | 2,824 | 2,854 | 2,818 | 2,787 | 2,796 | 2,735 | 2,760 | 2,429 |
| Change in stocks all oils | 7,607 | 8,414 | 8,365 | 8,143 | 6,760 | 4,080 | 7,920 | 829 | 1,164 | 4,048 | 5,222 | 1,535 | 64,087 | ‡24,764 |
| DEMAND: | | | | | | | | | | | | | | |
| Total demand | 72,933 | 68,282 | 75,897 | 73,099 | 78,841 | 79,228 | 79,623 | 87,632 | 83,362 | 82,343 | 78,669 | 83,261 | 943,170 | 911,375 |
| Daily average | 2,353 | 2,439 | 2,448 | 2,437 | 2,543 | 2,641 | 2,568 | 2,827 | 2,779 | 2,656 | 2,622 | 2,686 | 2,584 | 2,497 |
| †Exports: | | | | | | | | | | | | | | |
| Crude | 1,204 | 1,165 | 1,199 | 1,171 | 1,390 | 1,410 | 1,089 | 1,382 | 1,297 | 1,539 | 1,280 | 1,717 | 15,843 | 15,407 |
| Refined | 10,062 | 9,686 | 9,450 | 9,917 | 11,863 | 11,307 | 10,057 | 11,743 | 9,649 | 11,458 | 10,641 | 9,863 | 125,696 | 116,087 |
| Domestic demand | 61,667 | 57,431 | 65,248 | 62,011 | 65,588 | 66,511 | 68,477 | 74,507 | 72,416 | 69,346 | 66,748 | 71,681 | 801,631 | 779,881 |
| Daily average | 1,989 | 2,051 | 2,105 | 2,067 | 2,116 | 2,217 | 2,209 | 2,403 | 2,414 | 2,237 | 2,225 | 2,312 | 2,196 | 2,137 |
| STOCKS (end of month): | | | | | | | | | | | | | | |
| Crude: | | | | | | | | | | | | | | |
| ‖East of California: | | | | | | | | | | | | | | |
| Light | 230,872 | 237,968 | 244,785 | 251,673 | 259,469 | 268,217 | 277,772 | 287,465 | 291,581 | 297,263 | 300,475 | 303,639 | 303,639 | 225,404 |
| Heavy | 48,100 | 47,490 | 45,325 | 46,222 | 47,547 | 47,485 | 47,158 | 46,208 | 48,160 | 48,094 | 48,410 | 48,007 | 48,007 | 52,860 |
| California: | | | | | | | | | | | | | | |
| Light | 31,017 | 29,770 | 29,568 | 29,460 | 27,143 | 26,898 | 25,301 | 23,262 | 22,795 | 21,609 | 21,191 | 20,058 | 20,058 | 30,861 |
| ‖Heavy | 87,971 | 87,640 | 87,886 | 88,383 | 90,289 | 90,516 | 91,695 | 91,965 | 92,186 | 91,858 | 92,555 | 91,797 | 91,797 | 87,270 |
| Total crude | 397,960 | 402,868 | 407,564 | 415,738 | 424,448 | 433,116 | 441,926 | 448,900 | 454,722 | 458,824 | 462,631 | 463,501 | 463,501 | 396,395 |
| Natural gasoline at plants | 560 | 619 | 697 | 788 | 926 | 971 | 992 | 846 | 736 | 781 | 820 | 734 | 734 | 455 |
| Total refined | 129,184 | 132,631 | 136,222 | 136,100 | 134,012 | 129,379 | 128,468 | 122,469 | 117,921 | 117,822 | 119,198 | 119,949 | 119,949 | 123,247 |
| GRAND TOTAL STOCKS | 527,704 | 536,118 | 544,483 | 552,626 | 559,386 | 563,466 | 571,386 | 572,215 | 573,379 | 577,427 | 582,649 | 584,184 | 584,184 | 520,097 |
| ¶Days' supply | 224 | 220 | 222 | 227 | 220 | 213 | 223 | 202 | 206 | 217 | 222 | 217 | 226 | 209 |
| †Bunker oil (included above in domestic demand) | 3,940 | 3,587 | 3,874 | 4,204 | 4,250 | 4,244 | 4,077 | 4,470 | 4,436 | 4,594 | 3,953 | 4,264 | 49,893 | 46,662 |

*Final figures. †From Bureau of Foreign & Domestic Commerce. Exports, except Wax, include shipments to Alaska, Hawaii and Porto Rico. ‡Decrease. ‖Exclusive of producers' stocks. ¶Includes fuel oil. ¶Grand total stocks divided by daily average total demand.

## PRODUCTION OF CRUDE PETROLEUM BY STATES

(Petroleum transported from producing properties. Thousands of barrels of 42 U. S. gallons.)

Final figures will include petroleum consumed on the leases and produced but not transported from producing properties, which items for the past few years have amounted to approximately 1 per cent of the total.

| State— | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. | 1927 | *1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arkansas | 4,079 | 3,549 | 3,834 | 3,299 | 3,532 | 3,328 | 3,322 | 3,220 | 3,111 | 3,165 | 2,923 | 2,807 | 40,179 | 58,332 |
| †California | 20,185 | 17,983 | 19,836 | 19,494 | 19,506 | 19,181 | 19,319 | 19,279 | 19,065 | 19,449 | 18,516 | 18,939 | 230,752 | 224,671 |
| Colorado | 233 | 221 | 243 | 299 | 243 | 217 | 241 | 229 | 208 | 217 | 219 | 217 | 2,787 | 2,768 |
| Illinois | 587 | 557 | 696 | 535 | 600 | 600 | 574 | 605 | 625 | 555 | 561 | 529 | 7,024 | 7,760 |
| Indiana | 64 | 70 | 67 | 65 | 71 | 74 | 79 | 76 | 74 | 75 | 72 | 74 | 852 | 800 |
| Southwestern | 55 | 58 | 55 | 53 | 59 | 61 | 60 | 66 | 64 | 66 | 64 | 66 | 727 | 668 |
| Northeastern | 9 | 12 | 12 | 12 | 12 | 13 | 10 | 10 | 10 | 9 | 8 | 8 | 125 | 150 |
| Kansas | 3,598 | 3,363 | 3,590 | 3,478 | 3,563 | 3,432 | 3,353 | 3,297 | 3,229 | 3,313 | 3,260 | 3,264 | 40,740 | 41,498 |
| Kentucky | 509 | 502 | 549 | 541 | 556 | 558 | 588 | 613 | 587 | 590 | 586 | 554 | 6,733 | 6,276 |
| Louisiana | 1,892 | 1,733 | 1,873 | 1,688 | 1,652 | 1,652 | 1,846 | 1,864 | 1,761 | 1,745 | 1,634 | 1,721 | 21,061 | 23,201 |
| Gulf Coast | 295 | 276 | 279 | 239 | 230 | 230 | 252 | 254 | 242 | 234 | 245 | 311 | 3,087 | 4,140 |
| Rest of state | 1,597 | 1,457 | 1,594 | 1,449 | 1,422 | 1,422 | 1,594 | 1,610 | 1,519 | 1,511 | 1,389 | 1,410 | 17,974 | 19,061 |
| Michigan | 29 | 29 | 38 | 40 | 39 | 41 | 37 | 40 | 38 | 38 | 33 | 33 | 435 | 94 |
| Montana | 413 | 407 | 445 | 410 | 454 | 474 | 466 | 455 | 415 | 404 | 361 | 344 | 5,048 | 7,727 |
| New Mexico | 132 | 135 | 141 | 146 | 100 | 90 | 85 | 81 | 72 | 64 | 77 | 80 | 1,203 | 1,666 |
| New York | 170 | 169 | 194 | 184 | 191 | 188 | 184 | 200 | 192 | 189 | 187 | 191 | 2,239 | 1,956 |
| Ohio | 579 | 593 | 685 | 641 | 670 | 665 | 627 | 662 | 630 | 622 | 591 | 564 | 7,529 | 7,272 |
| Central and east | 448 | 449 | 527 | 497 | 521 | 507 | 482 | 514 | 487 | 478 | 468 | 443 | 5,821 | 5,392 |
| Northwestern | 131 | 144 | 158 | 144 | 149 | 158 | 145 | 148 | 143 | 144 | 123 | 121 | 1,708 | 1,880 |
| Oklahoma | 18,497 | 19,828 | 22,558 | 21,236 | 23,318 | 23,519 | 26,861 | 26,283 | 24,366 | 24,810 | 23,689 | 22,309 | 277,274 | 179,196 |
| Osage County | 2,229 | 2,031 | 2,204 | 2,020 | 2,095 | 2,025 | 1,953 | 1,897 | 1,740 | 1,789 | 1,796 | 1,807 | 23,586 | 25,356 |
| Rest of state | 16,268 | 17,797 | 20,354 | 19,216 | 21,223 | 21,494 | 24,908 | 24,386 | 22,626 | 23,021 | 21,893 | 20,502 | 253,688 | 153,839 |
| Pennsylvania | 721 | 735 | 842 | 804 | 813 | 830 | 797 | 833 | 813 | 826 | 800 | 782 | 9,596 | 8,961 |
| Tennessee | 5 | 4 | 3 | 4 | 5 | 4 | 5 | 9 | 5 | 6 | 6 | 4 | 60 | 43 |
| Texas | 17,508 | 15,906 | 17,373 | 17,360 | 18,527 | 17,407 | 17,498 | 17,936 | 17,791 | 18,900 | 18,156 | 19,406 | 213,768 | 166,916 |
| Gulf Coast | 4,471 | 3,876 | 4,095 | 3,877 | 4,033 | 3,933 | 3,804 | 3,760 | 3,702 | 3,789 | 3,556 | 3,696 | 46,592 | 41,135 |
| Rest of state | 13,037 | 12,030 | 13,278 | 13,483 | 14,494 | 13,474 | 13,694 | 14,176 | 14,089 | 15,111 | 14,600 | 15,710 | 167,176 | 125,781 |
| West Virginia | 466 | 468 | 544 | 502 | 512 | 509 | 491 | 571 | 501 | 500 | 478 | 467 | 6,009 | 5,946 |
| Wyoming | 1,808 | 1,622 | 1,793 | 1,864 | 1,923 | 1,769 | 1,969 | 1,735 | 1,598 | 1,613 | 1,629 | 1,823 | 21,146 | 25,776 |
| Salt Creek | 1,274 | 1,163 | 1,252 | 1,294 | 1,340 | 1,267 | 1,318 | 1,109 | 985 | 1,004 | 1,065 | 1,228 | 14,299 | 18,010 |
| Rest of state | 534 | 459 | 541 | 570 | 583 | 502 | 651 | 626 | 613 | 609 | 564 | 595 | 6,847 | 7,766 |
| | 71,475 | 67,874 | 75,304 | 72,590 | 76,275 | 74,538 | 78,333 | 77,998 | 75,081 | 77,081 | 73,778 | 74,108 | 894,435 | 770,874 |
| Classification by gravity (approx.) Light crude | 61,324 | 58,850 | 65,435 | 63,227 | 66,901 | 65,335 | 68,866 | 68,765 | 66,247 | 68,037 | 65,378 | 65,784 | 784,149 | 633,726 |
| Heavy crude | 10,151 | 9,024 | 9,869 | 9,363 | 9,374 | 9,203 | 9,467 | 9,233 | 8,834 | 9,044 | 8,400 | 8,324 | 110,286 | 137,148 |

*Final figures include 8,000 bbls. produced in Alaska and Utah. †Preliminary figures from American Petroleum Institute, final figures (1926) from Calif. State Mining Bureau.

## STOCKS OF CRUDE PETROLEUM HELD IN THE UNITED STATES

(Thousands of barrels of 42 U. S. gallons.)

| | Jan. 31 1927 | Feb. 28 | Mar. 31 | Apr. 30 | May 31 | June 30 | July 31 | Aug. 31 | Sept. 30 | Oct. 31 | Nov. 30 | Dec. 31 1927 | Dec. 31 *1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AT REFINERIES: (and in coastwise transit thereto.) Reported by location of storage: East Coast—Domestic | 7,315 | 7,585 | 7,230 | 7,464 | 7,754 | 8,720 | 8,999 | 9,401 | 9,062 | 8,772 | 8,045 | 8,690 | 7,240 |
| Foreign | 2,164 | 2,604 | 2,206 | 2,782 | 3,043 | 2,909 | 2,671 | 3,029 | 2,986 | 2,675 | 2,726 | 2,686 | 2,186 |
| Appalachian | 1,597 | 1,606 | 1,627 | 1,648 | 1,662 | 1,668 | 1,785 | 1,783 | 1,768 | 1,740 | 1,822 | 1,871 | 1,673 |
| Indiana, Illinois, etc. | 2,284 | 2,491 | 2,561 | 2,545 | 2,465 | 2,507 | 2,563 | 2,746 | 2,727 | 2,737 | 2,692 | 2,777 | 2,224 |
| Oklahoma, Kansas, etc. | 3,135 | 3,551 | 3,841 | 3,922 | 4,301 | 4,413 | 4,428 | 4,400 | 4,536 | 4,850 | 4,924 | 4,871 | 2,936 |
| Texas: Inland | 1,094 | 1,120 | 1,197 | 1,173 | 1,196 | 1,304 | 1,450 | 1,463 | 1,621 | 1,677 | 1,656 | 1,432 | 962 |
| Gulf Coast: Domestic | 8,133 | 8,305 | 8,481 | 8,220 | 8,307 | 6,961 | 6,657 | 6,758 | 7,295 | 7,473 | 7,653 | 7,686 | 8,194 |
| Foreign | 152 | 237 | 257 | 323 | 304 | 242 | 226 | 203 | 204 | 174 | 204 | 219 | 236 |
| Northern Louisiana and Arkansas | 553 | 560 | 441 | 408 | 420 | 431 | 454 | 448 | 355 | 462 | 457 | 408 | 601 |
| Louisiana Gulf Coast: Domestic | 6,787 | 7,179 | 7,317 | 6,788 | 4,793 | 4,037 | 4,559 | 5,126 | 5,130 | 5,643 | 6,104 | 6,149 | 7,019 |
| Foreign | 722 | 967 | 889 | 832 | 1,072 | 1,282 | 1,373 | 1,288 | 1,083 | 1,043 | 1,150 | 1,046 | 902 |
| Rocky Mountain | 1,608 | 1,504 | 1,385 | 1,380 | 1,181 | 1,293 | 1,382 | 1,385 | 1,446 | 1,368 | 1,394 | 1,400 | 1,422 |
| TOTAL east of California | 35,544 | 37,709 | 37,432 | 37,485 | 36,498 | 35,767 | 36,545 | 38,030 | 38,213 | 38,554 | 38,827 | 39,235 | 35,475 |
| ELSEWHERE THAN AT REFINERIES: | | | | | | | | | | | | | |
| Domestic—Reported by field of origin (net stocks): Appalachian: N. Y., Pa., W. Va., east and central Ohio | 6,319 | 6,391 | 6,424 | 6,597 | 6,692 | 6,733 | 6,855 | 6,962 | 6,728 | 6,552 | 6,501 | 6,285 | 6,570 |
| Kentucky | 1,116 | 1,128 | 1,151 | 1,212 | 1,288 | 1,343 | 1,198 | 1,176 | 1,139 | 1,081 | 1,090 | 1,041 | 1,220 |
| Lima-Indiana | 667 | 666 | 695 | 731 | 771 | 820 | 900 | 946 | 1,007 | 1,077 | 1,109 | 1,134 | 666 |
| Illinois-Southwest Indiana | 11,887 | 11,808 | 11,810 | 11,762 | 11,729 | 11,712 | 12,184 | 12,184 | 12,113 | 12,100 | 12,189 | 12,170 | 11,770 |
| Mid-Continent: Okla., Kans., Central and North and West Texas | 147,209 | 153,248 | 159,050 | 167,175 | 176,827 | 185,376 | 194,085 | 201,977 | 208,300 | 214,707 | 218,378 | 221,558 | 142,206 |
| Northern Louisiana and Arkansas | 30,089 | 29,011 | 28,405 | 27,558 | 27,752 | 28,191 | 27,792 | 27,099 | 26,640 | 25,628 | 25,577 | 25,373 | 31,640 |
| Gulf Coast | 18,156 | 17,703 | 17,896 | 17,955 | 18,073 | 18,257 | 17,696 | 17,625 | 17,766 | 17,679 | 17,619 | 17,526 | 20,031 |
| Rocky Mountain | 27,474 | 27,236 | 26,835 | 26,972 | 27,100 | 27,199 | 27,377 | 27,415 | 27,599 | 27,681 | 27,256 | 27,235 | 28,075 |
| TOTAL east of California | 242,917 | 247,191 | 252,266 | 259,962 | 270,232 | 279,631 | 288,087 | 295,384 | 301,292 | 306,505 | 309,719 | 312,322 | 242,180 |
| Foreign crude: Atlantic Coast | 84 | 108 | 71 | 109 | 80 | 67 | 42 | 39 | 53 | 100 | 106 | 52 | 165 |
| Gulf Coast | 427 | 450 | 341 | 339 | 206 | 237 | 256 | 220 | 183 | 198 | 233 | 37 | 444 |
| Total domestic and foreign stocks east of California | 278,972 | 285,458 | 290,110 | 297,895 | 307,016 | 315,702 | 324,930 | 333,673 | 339,741 | 345,357 | 348,885 | 351,646 | 278,264 |
| CLASSIFICATION BY GRAVITY (approx.) East of California: | | | | | | | | | | | | | |
| Light crude (24 degrees and above) | 230,013 | 237,968 | 244,785 | 251,673 | 259,469 | 268,217 | 277,772 | 287,465 | 291,581 | 297,263 | 300,475 | 303,639 | 225,404 |
| Heavy crude (below 24 degrees) | 48,959 | 47,490 | 45,325 | 46,222 | 47,547 | 47,485 | 47,158 | 46,208 | 48,160 | 48,094 | 48,410 | 48,007 | 52,860 |
| CALIFORNIA: Light | 31,017 | 29,770 | 29,568 | 29,460 | 27,143 | 26,898 | 25,301 | 23,262 | 22,795 | 21,609 | 21,191 | 20,058 | 30,861 |
| Heavy (including fuel oil) | 87,971 | 87,640 | 87,886 | 88,383 | 90,289 | 90,516 | 91,695 | 91,965 | 92,186 | 91,858 | 92,555 | 91,797 | 87,270 |

*Final figures.

# Three Important Steps

1

2

3

*In The Making Of*

# Vogt

## DROP FORGED STEEL VALVES

1 The Billet
2 The Rough Forging
3 The Finished Valve

Branch Offices:
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**HENRY VOGT MACHINE CO., Inc.**
**LOUISVILLE, KY.**

*Manufacturers of:* Oil Refinery Equipment, Drop Forged Steel Valves and Fittings, Water Tube and Horizontal Return Tubular Boilers, Ice Making and Refrigerating Machinery.

## PRODUCTION OF CRUDE PETROLEUM BY FIELDS

(Thousands of barrels of 42 U. S. gallons)

| Field | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. | 1927 | *1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appalachian | 2,319 | 2,327 | 2,659 | 2,532 | 2,598 | 2,596 | 2,547 | 2,740 | 2,585 | 2,589 | 2,525 | 2,441 | 30,458 | 28,572 |
| Lima-Indiana | 140 | 156 | 170 | 156 | 161 | 171 | 155 | 158 | 153 | 153 | 131 | 129 | 1,833 | 2,030 |
| Michigan | 29 | 29 | 38 | 40 | 39 | 41 | 37 | 40 | 38 | 38 | 33 | 33 | 435 | 94 |
| Illinois & S. W. Indiana | 642 | 615 | 751 | 588 | 659 | 661 | 634 | 671 | 689 | 621 | 625 | 595 | 7,751 | 8,418 |
| Mid-Continent | 40,808 | 40,227 | 44,854 | 42,945 | 46,329 | 45,175 | 48,824 | 48,596 | 46,314 | 47,910 | 45,861 | 45,500 | 543,343 | 423,807 |
| Gulf Coast | 4,766 | 4,152 | 4,374 | 4,116 | 4,263 | 4,163 | 4,056 | 4,014 | 3,944 | 4,023 | 3,801 | 4,007 | 49,679 | 45,275 |
| Rocky Mountain | 2,586 | 2,385 | 2,622 | 2,719 | 2,720 | 2,550 | 2,761 | 2,500 | 2,293 | 2,298 | 2,286 | 2,464 | 30,184 | †37,945 |
| California | 20,185 | 17,983 | 19,836 | 19,494 | 19,506 | 19,181 | 19,319 | 19,279 | 19,065 | 19,449 | 18,516 | 18,939 | 230,752 | 224,671 |
| Totals | 71,475 | 67,874 | 75,304 | 72,590 | 76,275 | 74,538 | 78,332 | 77,998 | 75,081 | 77,081 | 73,778 | 74,108 | 894,435 | 770,874 |

*Final figures. †Includes Alaska.

## INDICATED DELIVERIES OF CRUDE PETROLEUM, EXCLUSIVE OF CALIFORNIA GRADES, TO DOMESTIC CONSUMERS

(Thousands of barrels of 42 U. S. gallons)

| Domestic petroleum by fields of origin: | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. | 1927 | *1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appalachian | 2,674 | 2,243 | 2,603 | 2,298 | 2,427 | 2,500 | 2,570 | 2,655 | 2,856 | 2,823 | 2,567 | 2,766 | 30,982 | 29,343 |
| Lima-Indiana | 139 | 157 | 141 | 120 | 121 | 122 | 75 | 113 | 92 | 83 | 99 | 104 | 1,365 | 2,339 |
| Michigan | 29 | 29 | 38 | 40 | 39 | 41 | 37 | 40 | 38 | 38 | 33 | 33 | 435 | 94 |
| Illinois & S. W. Indiana | 525 | 694 | 749 | 636 | 692 | 678 | 162 | 671 | 760 | 634 | 536 | 614 | 7,351 | 7,941 |
| Mid-Continent | 37,358 | 35,266 | 39,658 | 35,667 | 36,483 | 36,187 | 40,514 | 41,397 | 40,450 | 42,515 | 42,241 | 42,524 | 470,260 | 447,713 |
| Gulf Coast | 6,641 | 4,605 | 4,181 | 4,057 | 4,145 | 3,979 | 4,617 | 4,085 | 3,803 | 4,110 | 3,861 | 4,100 | 52,184 | 44,484 |
| Rocky Mountain | 3,187 | 2,623 | 3,023 | 2,582 | 2,592 | 2,451 | 2,583 | 2,462 | 2,109 | 2,216 | 2,711 | 2,485 | 31,024 | †38,709 |
| Deliveries and exports | 50,553 | 45,617 | 50,393 | 45,400 | 46,499 | 45,958 | 50,558 | 51,422 | 50,108 | 52,419 | 52,048 | 52,566 | 593,541 | 569,923 |
| Deliveries | 49,695 | 44,938 | 49,727 | 44,782 | 45,428 | 45,068 | 49,845 | 50,414 | 49,229 | 51,305 | 51,093 | 51,447 | 582,971 | 559,900 |
| Foreign petroleum | 4,612 | 4,134 | 4,580 | 4,027 | 4,719 | 4,001 | 4,830 | 6,300 | 5,145 | 4,571 | 5,298 | 6,459 | 58,676 | 60,179 |
| Deliveries of domestic and foreign petroleum | 54,307 | 49,072 | 54,307 | 48,809 | 50,147 | 49,069 | 54,675 | 56,714 | 54,374 | 55,876 | 56,391 | 57,906 | 641,647 | 620,079 |

*Final figures. †Includes Alaska.

## IMPORTS AND EXPORTS OF CRUDE PETROLEUM*

(Thousands of barrels of 42 U. S. gallons)

| | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. | 1927 | †1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Imports | 4,514 | 4,181 | 4,434 | 4,063 | 4,557 | 4,019 | 4,824 | 6,261 | 5,122 | 4,633 | 5,339 | 6,209 | 58,156 | 60,382 |
| From Mexico | 2,040 | 1,771 | 1,651 | 1,947 | 2,749 | 2,733 | 2,825 | 3,375 | 2,234 | 1,503 | 1,864 | 1,327 | 26,019 | 40,398 |
| From Venezuela | 1,320 | 1,752 | 1,477 | 1,055 | 1,031 | 896 | 1,309 | 2,215 | 1,759 | 2,260 | 2,748 | 3,510 | 21,332 | 12,285 |
| From Colombia | 839 | 585 | 856 | 591 | 625 | 180 | 542 | 381 | 764 | 797 | 727 | 1,075 | 7,962 | 3,621 |
| From other countries | 315 | 73 | 450 | 470 | 152 | 210 | 148 | 290 | 365 | 73 | ..... | 297 | 2,843 | 4,078 |
| Exports | 1,204 | 1,165 | 1,199 | 1,171 | 1,390 | 1,410 | 1,089 | 1,382 | 1,297 | 1,539 | 1,280 | 1,717 | 15,843 | 15,407 |
| Domestic crude oil: | | | | | | | | | | | | | | |
| To Canada | 968 | 884 | 1,043 | 1,020 | 1,117 | 1,191 | 894 | 1,200 | 1,038 | 1,271 | 998 | 1,412 | 13,036 | 12,981 |
| To other countries | 236 | 281 | 156 | 151 | 273 | 219 | 195 | 182 | 259 | 268 | 282 | 305 | 2,807 | 2,423 |
| Foreign crude oil | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 |

*From Bureau of Foreign & Domestic Commerce. †Final figures.

## SHIPMENTS OF OIL FROM CALIFORNIA TO EASTERN PORTS IN UNITED STATES VIA PANAMA CANAL*

(Thousands of barrels of 42 U. S. gallons)

| | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. | 1927 | †1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crude oil | 389 | 831 | 572 | 462 | 1,341 | 1,247 | 1,124 | 1,313 | 818 | 844 | 864 | 886 | 10,691 | 11,194 |
| Refined products | 2,321 | 2,497 | 1,816 | 1,977 | 1,640 | 1,603 | 1,862 | 2,144 | 2,564 | 1,571 | 1,466 | 1,549 | 23,010 | 22,140 |
| Gasoline | 749 | 1,101 | 606 | 872 | 999 | 1,043 | 1,133 | 1,268 | 1,046 | 984 | 940 | 934 | 11,675 | 8,453 |
| Tops | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 324 |
| Gas oil | 499 | 229 | 380 | 450 | 152 | 236 | 315 | 232 | 457 | 154 | 382 | 542 | 4,028 | 5,000 |
| Fuel oil | 1,072 | 1,167 | 758 | 654 | 488 | 255 | 413 | 575 | 1,060 | 363 | 75 | 72 | 6,952 | 8,115 |
| Lubricants | 1 | ..... | 72 | 1 | 1 | 69 | 1 | 69 | 1 | 70 | 69 | 1 | 355 | 567 |

*Compiled by the San Francisco office of the Bureau of Mines. †Final figures.

## NUMBER OF PRODUCING OIL WELLS COMPLETED*

| January | February | March | April | May | June | July | August | September | October | November | December | 1927 | †1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,385 | 1,342 | 1,417 | 1,528 | 1,274 | 1,248 | 1,275 | 1,120 | 1,056 | 1,086 | 1,044 | 965 | 14,680 | 19,013 |

*For States east of California from The Oil and Gas Journal; for California, from the American Petroleum Institute. †Final figures.

## PRODUCTION AND STOCKS OF REFINERIES IN THE UNITED STATES, 1927

(Thousands of barrels of 42 U. S. gallons, except wax, coke, and asphalt)

| | Runs to Stills: Domestic Crude | Runs to Stills: Foreign Crude | Runs to Stills: Unfinished Oils Rerun | Natural Gas Gasoline | Gasoline | Kerosene | Gas oil and fuel oil | Lubricants | Wax (thousands of pounds) | Coke (tons) | Asphalt (tons) | Other finished products | Unfinished oil produced | Losses |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Coast | 108,512 | 40,642 | 9,317 | 2,468 | 49,090 | 10,413 | 72,980 | 10,144 | 226,039 | 149,400 | 1,717,100 | 1,134 | 736 | 5,540 |
| Appalachian | 28,941 | ..... | 1,258 | 737 | 12,581 | 3,836 | 6,997 | 4,410 | 87,856 | 23,500 | 2,500 | 341 | 684 | 1,620 |
| Indiana, Illinois, etc. | 75,807 | ..... | 5,137 | 1,916 | 43,682 | 5,260 | 21,850 | 3,309 | 67,306 | 297,200 | 303,200 | 1,297 | 1,485 | 2,502 |
| Oklahoma, Kansas, etc | 101,871 | ..... | 3,437 | 4,249 | 55,215 | 9,123 | 33,653 | 2,365 | 47,099 | 242,100 | 7,000 | 694 | 1,835 | 4,139 |
| Texas | 166,281 | 814 | 7,735 | 6,129 | 71,276 | 13,892 | 72,304 | 7,849 | 66,295 | 220,500 | 241,300 | 112 | 4,947 | 8,031 |
| Louisiana-Arkansas | 62,199 | 7,245 | 1,585 | 4,979 | 24,006 | 6,129 | 31,544 | 741 | 51,344 | 143,800 | 584,900 | 1,645 | 7,268 | 1,573 |
| Rocky Mountain | 25,026 | ..... | 6,225 | 1,148 | 14,313 | 1,864 | 7,348 | 590 | 38,408 | 68,700 | 27,500 | 336 | 6,590 | 624 |
| California | 210,176 | ..... | 4,941 | *10,535 | 60,504 | 5,597 | 145,662 | 2,313 | ..... | ..... | 535,100 | 1,846 | 3,450 | 3,291 |
| Total | 779,813 | 48,701 | 39,635 | 32,161 | 330,667 | 56,114 | 392,342 | 31,721 | 584,347 | 1,145,200 | 3,418,600 | 7,405 | 26,995 | 28,329 |
| Texas Gulf Coast | 129,189 | 814 | 7,029 | 5,206 | 56,412 | 11,425 | 55,277 | 7,470 | 62,558 | 191,200 | 241,300 | 18 | 2,493 | 6,737 |
| Louisiana Gulf Coast | 43,168 | 7,245 | 492 | 4,044 | 19,006 | 5,452 | 17,883 | 737 | 51,344 | 131,000 | 566,600 | 1,532 | 5,757 | 670 |
| January | 65,952 | 3,651 | 3,466 | 2,595 | 27,960 | 5,113 | 32,936 | 2,570 | 54,114 | 92,900 | 191,200 | 511 | 2,473 | 2,367 |
| February | 59,887 | 3,149 | 3,441 | 2,475 | 25,024 | 4,453 | 30,185 | 2,345 | 47,363 | 88,100 | 172,700 | 546 | 2,729 | 2,091 |
| March | 64,954 | 3,787 | 3,617 | 2,694 | 27,886 | 4,802 | 32,377 | 2,754 | 53,644 | 98,200 | 222,300 | 525 | 2,412 | 2,369 |
| April | 63,235 | 3,389 | 3,550 | 2,603 | 26,577 | 4,608 | 31,856 | 2,615 | 48,917 | 88,400 | 273,800 | 561 | 2,224 | 2,237 |
| May | 66,325 | 3,434 | 2,653 | 2,701 | 26,787 | 4,663 | 33,499 | 2,625 | 46,267 | 87,900 | 319,000 | 599 | 1,995 | 2,599 |
| June | 64,059 | 3,638 | 3,151 | 2,315 | 26,616 | 4,308 | 31,691 | 2,571 | 44,938 | 95,300 | 347,100 | 677 | 2,283 | 2,487 |
| July | 67,790 | 3,835 | 2,942 | 2,642 | 28,118 | 4,484 | 33,693 | 2,672 | 47,979 | 90,400 | 334,700 | 747 | 2,490 | 2,516 |
| August | 66,498 | 4,503 | 3,551 | 2,527 | 28,010 | 4,420 | 34,098 | 2,752 | 41,576 | 94,800 | 339,500 | 743 | 1,955 | 2,598 |
| September | 64,197 | 4,389 | 3,670 | 2,676 | 27,716 | 4,686 | 32,339 | 2,782 | 47,888 | 97,500 | 333,100 | 634 | 1,811 | 2,453 |
| October | 66,694 | 5,238 | 3,297 | 2,934 | 28,903 | 4,884 | 34,045 | 2,757 | 49,476 | 101,600 | 332,600 | 663 | 1,977 | 2,405 |
| November | 64,832 | 4,755 | 3,156 | 2,965 | 28,558 | 4,824 | 32,594 | 2,477 | 48,146 | 102,300 | 290,000 | 606 | 2,211 | 2,145 |
| December | 65,390 | 4,933 | 3,141 | 3,034 | 28,512 | 4,869 | 33,029 | 2,801 | 54,039 | 107,800 | 262,600 | 593 | 2,435 | 2,062 |
| STOCKS END OF MONTH | (†) | | (†) | (†) | | | (†) | | | | | | | |
| January | 32,506 | 3,038 | 39,287 | ..... | 46,058 | 8,190 | 23,195 | 7,887 | 192,835 | 287,400 | 215,300 | 1,189 | ..... | ..... |
| February | 33,901 | 3,808 | 38,986 | ..... | 49,714 | 8,655 | 22,099 | 8,361 | 198,452 | 294,700 | 234,500 | 1,282 | ..... | ..... |
| March | 34,080 | 3,352 | 39,392 | ..... | 52,410 | 8,753 | 22,561 | 8,035 | 201,340 | 325,500 | 235,300 | 1,356 | ..... | ..... |
| April | 33,548 | 3,937 | 38,095 | ..... | 52,379 | 8,725 | 23,732 | 8,176 | 211,019 | 318,500 | 219,500 | 1,410 | ..... | ..... |
| May | 32,079 | 4,419 | 37,760 | ..... | 48,609 | 8,568 | 26,059 | 8,011 | 207,329 | 329,400 | 222,500 | 1,368 | ..... | ..... |
| June | 31,334 | 4,433 | 38,192 | ..... | 43,768 | 8,567 | 26,590 | 7,628 | 198,808 | 293,100 | 232,400 | 1,180 | ..... | ..... |
| July | 32,275 | 4,270 | 39,615 | ..... | 39,069 | 9,038 | 28,890 | 7,496 | 191,501 | 305,800 | 214,100 | 928 | ..... | ..... |
| August | 33,510 | 4,520 | 38,681 | ..... | 33,455 | 8,373 | 30,346 | 7,491 | 180,645 | 303,600 | 192,200 | 879 | ..... | ..... |
| September | 33,940 | 4,273 | 36,962 | ..... | 29,738 | 8,120 | 31,631 | 7,447 | 170,172 | 313,500 | 176,300 | 862 | ..... | ..... |
| October | 34,662 | 3,892 | 35,874 | ..... | 29,550 | 7,325 | 33,191 | 7,584 | 170,367 | 331,300 | 189,400 | 960 | ..... | ..... |
| November | 34,747 | 4,080 | 35,209 | ..... | 30,401 | 7,841 | 33,637 | 7,524 | 171,700 | 349,200 | 196,200 | 1,120 | ..... | ..... |
| December | 35,284 | 3,951 | 35,314 | ..... | 32,323 | 7,669 | 31,982 | 7,860 | 167,214 | 345,100 | 220,800 | 1,221 | ..... | ..... |

*Includes 3,369,000 bbls. turned into pipe lines and included in crude in monthly reports. †East of California. ‡Stocks of natural-gas gasoline included in stocks of unfinished oils.

## SUMMARY OF MONTHLY (PRELIMINARY) NATURAL-GAS GASOLINE AND MOTOR FUEL STATISTICS IN THE UNITED STATES IN 1927, IN MILLIONS OF GALLONS

| | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. | 1927 | *1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Natural-gas gasoline (raw): | | | | | | | | | | | | | | |
| Production by fields— | | | | | | | | | | | | | | |
| Appalachian | 11.2 | 9.9 | 9.6 | 8.3 | 7.2 | 5.8 | 5.4 | 5.7 | 5.6 | 7.4 | 8.3 | 10.0 | 94.4 | 96.8 |
| Kentucky and Illinois | 1.7 | 1.5 | 1.5 | 1.4 | 1.2 | 1.1 | 1.1 | 1.2 | 1.2 | 1.4 | 1.4 | 1.3 | 16.0 | 17.7 |
| Oklahoma and Kansas | 43.6 | 41.7 | 45.6 | 45.3 | 47.7 | 47.2 | 48.2 | 48.7 | 50.5 | 53.0 | 53.7 | 57.3 | 582.5 | 563.1 |
| Texas | 24.7 | 23.9 | 29.4 | 26.4 | 26.7 | 25.4 | 25.6 | 27.2 | 26.3 | 27.6 | 27.5 | 27.0 | 316.6 | 292.2 |
| Louisiana and Arkansas | 6.9 | 6.4 | 7.0 | 7.0 | 7.3 | 6.8 | 7.0 | 7.3 | 6.4 | 6.3 | 6.7 | 6.8 | 82.5 | 75.7 |
| Rocky Mountain | 3.7 | 3.5 | 4.0 | 4.0 | 4.1 | 4.2 | 4.1 | 3.9 | 3.9 | 3.8 | 3.9 | 2.8 | 45.9 | 41.9 |
| Total east of California | 91.8 | 86.9 | 96.1 | 92.4 | 94.2 | 90.5 | 91.3 | 94.0 | 93.9 | 100.1 | 101.5 | 105.2 | 1,139.9 | 967.4 |
| California | 40.3 | 36.3 | 41.3 | 40.8 | 41.0 | 39.4 | 39.7 | 41.0 | 42.4 | 43.5 | 41.7 | 42.3 | 489.7 | 389.4 |
| Total United States | 132.1 | 123.2 | 137.4 | 133.2 | 135.2 | 129.9 | 131.0 | 135.0 | 136.3 | 143.6 | 143.2 | 147.5 | 1,627.6 | 1,356.8 |
| Daily average | 4.3 | 4.4 | 4.4 | 4.4 | 4.4 | 4.3 | 4.2 | 4.4 | 4.5 | 4.6 | 4.8 | 4.8 | 4.5 | 3.7 |
| Indicated deliveries | 127.7 | 120.7 | 134.1 | 129.4 | 129.4 | 128.0 | 130.1 | 141.2 | 140.9 | 141.7 | 141.6 | 151.1 | 1,615.9 | 1,353.0 |
| Stocks at end of period | 23.5 | 26.0 | 29.3 | 33.1 | 38.9 | 40.8 | 41.7 | 35.5 | 30.9 | 32.8 | 34.4 | 30.8 | 30.8 | 19.1 |
| Blending at plants: | | | | | | | | | | | | | | |
| Raw gasoline used* | 2.6 | 2.3 | 2.5 | 2.1 | 3.2 | 3.3 | 3.2 | 3.2 | 2.6 | 3.1 | 2.7 | 2.8 | 34.6 | 28.8 |
| Naphtha used* | 4.0 | 3.8 | 4.6 | 4.8 | 4.8 | 4.8 | 5.6 | 4.9 | 4.4 | 3.9 | 3.9 | 5.3 | 53.4 | 42.6 |
| Stocks of blends at end of period | 1.4 | 1.6 | 1.4 | 1.9 | 1.9 | 1.8 | 1.5 | 1.6 | 1.2 | 1.2 | 1.3 | 1.4 | 1.4 | 1.8 |
| Indicated output of motor fuel: | | | | | | | | | | | | | | |
| Gasoline produced at refineries | 1,174.3 | 1,051.0 | 1,171.2 | 1,116.2 | 1,125.1 | 1,117.9 | 1,181.0 | 1,176.4 | 1,164.1 | 1,213.9 | 1,199.4 | 1,197.5 | 13,888.0 | 12,583.8 |
| Natural-gas gasoline— | | | | | | | | | | | | | | |
| Blended at plants* | 2.6 | 2.3 | 2.5 | 2.1 | 3.2 | 3.3 | 3.2 | 3.2 | 2.6 | 3.1 | 2.7 | 2.8 | 34.6 | 28.8 |
| Sold to jobbers (estimated) | .8 | .8 | .8 | .8 | .8 | .8 | .8 | .8 | .8 | .8 | .8 | .8 | 9.6 | 9.6 |
| Benzol produced† | 9.1 | 8.4 | 9.5 | 9.1 | 9.3 | 8.8 | 9.0 | 9.0 | 8.8 | 9.1 | 8.6 | 8.9 | 107.6 | 98.7 |
| Total United States | 1,186.8 | 1,062.5 | 1,184.0 | 1,129.2 | 1,138.4 | 1,130.8 | 1,194.0 | 1,189.4 | 1,176.3 | 1,226.9 | 1,211.5 | 1,210.0 | 14,039.8 | 12,715.9 |
| Daily average | 38.3 | 37.9 | 38.2 | 37.6 | 36.7 | 37.7 | 38.5 | 38.4 | 39.6 | 39.6 | 40.4 | 39.0 | 38.5 | 34.8 |

*Exclusive of California. †Estimated with production of by-product coke as basis.
Prepared under supervision of G. R. Hopkins, head of statistics section, Petroleum Economics Division; H. H. Hill, chief of division.

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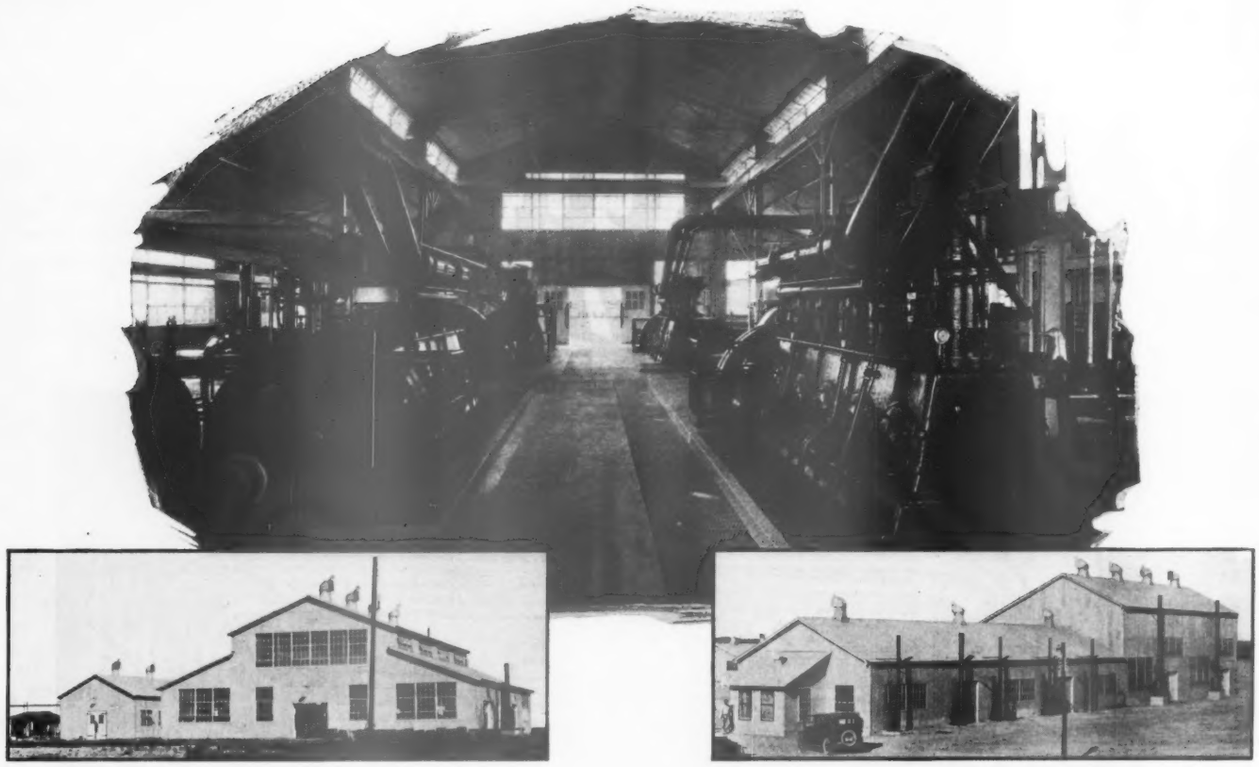

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**GASOLINE STATISTICS, 1927**
(Thousands of barrels of 42 U. S. gallons)

| | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. | 1927 | *1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION: | | | | | | | | | | | | | | |
| East Coast | 4,306 | 4,013 | 4,536 | 3,961 | 3,900 | 3,802 | 3,915 | 4,621 | 3,884 | 4,292 | 4,199 | 4,261 | 49,690 | 46,142 |
| Appalachian | 1,053 | 994 | 1,054 | 1,026 | 1,009 | 999 | 997 | 1,082 | 1,066 | 1,110 | 1,075 | 1,117 | 12,581 | 12,231 |
| Indiana, Illinois, etc. | 3,404 | 2,841 | 3,490 | 3,193 | 3,620 | 3,716 | 4,009 | 3,801 | 3,569 | 3,820 | 4,051 | 4,168 | 43,682 | 40,181 |
| Oklahoma, Kansas, etc. | 4,371 | 4,170 | 4,470 | 4,221 | 4,388 | 4,492 | 4,913 | 5,052 | 5,036 | 4,937 | 4,575 | 4,590 | 55,215 | 50,971 |
| Texas | 6,331 | 5,330 | 5,999 | 5,881 | 5,954 | 5,757 | 5,932 | 6,019 | 5,878 | 6,064 | 6,233 | 5,898 | 71,276 | 62,559 |
| Louisiana-Arkansas | 2,089 | 1,801 | 2,039 | 1,863 | 1,901 | 1,844 | 2,090 | 2,110 | 2,091 | 2,201 | 1,994 | 1,983 | 24,006 | 21,239 |
| Rocky Mountain | 1,432 | 1,293 | 1,433 | 1,402 | 1,013 | 1,183 | 1,196 | 949 | 907 | 1,104 | 1,209 | 1,192 | 14,313 | 16,350 |
| California | 4,974 | 4,582 | 4,865 | 5,030 | 5,002 | 4,823 | 5,066 | 4,976 | 5,286 | 5,375 | 5,222 | 5,303 | 60,504 | 50,061 |
| Total | 27,960 | 25,024 | 27,886 | 26,577 | 26,787 | 26,616 | 28,118 | 28,010 | 27,716 | 28,903 | 28,558 | 28,512 | 330,667 | 299,734 |
| Texas Gulf Coast | 5,217 | 4,196 | 4,763 | 4,700 | 4,769 | 4,429 | 4,633 | 4,726 | 4,645 | 4,789 | 4,917 | 4,628 | 56,412 | 48,748 |
| Louisiana Gulf Coast | 1,677 | 1,409 | 1,643 | 1,484 | 1,502 | 1,451 | 1,658 | 1,645 | 1,638 | 1,740 | 1,599 | 1,560 | 19,006 | 16,977 |
| STOCKS END OF PERIOD: | | | | | | | | | | | | | | |
| East Coast | 8,465 | 9,469 | 10,711 | 11,166 | 10,233 | 8,355 | 6,615 | 5,364 | 4,548 | 4,490 | 4,561 | 4,748 | 4,748 | 7,386 |
| Appalachian | 1,047 | 1,291 | 1,378 | 1,246 | 1,040 | 932 | 833 | 792 | 824 | 847 | 822 | 1,035 | 1,035 | 846 |
| Indiana, Illinois, etc. | 5,358 | 5,682 | 5,969 | 5,690 | 5,294 | 4,859 | 4,664 | 4,146 | 3,570 | 3,225 | 3,251 | 3,734 | 3,734 | 4,357 |
| Oklahoma, Kansas, etc. | 3,756 | 4,338 | 4,539 | 4,595 | 4,292 | 3,664 | 3,158 | 2,652 | 1,831 | 2,337 | 2,528 | 2,983 | 2,983 | 3,096 |
| Texas | 6,718 | 7,215 | 7,107 | 7,331 | 6,822 | 6,188 | 5,829 | 4,317 | 3,984 | 4,009 | 4,625 | 4,889 | 4,889 | 5,002 |
| Louisiana-Arkansas | 3,520 | 3,849 | 4,141 | 3,649 | 3,438 | 2,747 | 2,162 | 1,853 | 1,619 | 1,433 | 1,424 | 1,491 | 1,491 | 3,258 |
| Rocky Mountain | 4,510 | 4,767 | 5,031 | 5,204 | 4,855 | 4,495 | 3,970 | 2,980 | 1,971 | 1,408 | 1,336 | 1,643 | 1,643 | 4,137 |
| California | 12,684 | 13,103 | 13,534 | 13,498 | 12,635 | 12,528 | 11,838 | 11,351 | 11,391 | 11,801 | 11,854 | 11,800 | 11,800 | 10,941 |
| Total | 46,058 | 49,714 | 52,410 | 52,379 | 48,609 | 43,768 | 39,069 | 33,455 | 29,738 | 29,550 | 30,401 | 32,323 | 32,323 | 39,023 |
| Texas Gulf Coast | 6,140 | 6,446 | 6,249 | 6,473 | 5,687 | 5,362 | 5,107 | 3,728 | 3,335 | 3,358 | 3,925 | 4,197 | 4,197 | 4,569 |
| Louisiana Gulf Coast | 3,446 | 3,719 | 4,010 | 3,507 | 3,318 | 2,633 | 2,050 | 1,752 | 1,518 | 1,299 | 1,332 | 1,413 | 1,413 | 3,196 |
| PRODUCTION BY CRACKING: | | | | | | | | | | | | | | |
| East Coast | 1,735 | 1,593 | 1,586 | 1,250 | 1,292 | 1,155 | 1,329 | 1,400 | 1,367 | 1,564 | 1,525 | 1,577 | 17,383 | 17,826 |
| Appalachian | 245 | 236 | 245 | 239 | 244 | 216 | 229 | 256 | 259 | 250 | 269 | 295 | 2,982 | 3,157 |
| Indiana, Illinois, etc. | 1,547 | 1,279 | 1,509 | 1,338 | 1,508 | 1,545 | 1,658 | 1,617 | 1,585 | 1,693 | 1,814 | 1,835 | 18,928 | 18,730 |
| Oklahoma, Kansas, etc. | 1,337 | 1,319 | 1,403 | 1,202 | 1,253 | 1,303 | 1,493 | 1,490 | 1,521 | 1,584 | 1,481 | 1,554 | 16,940 | 14,791 |
| Texas | 2,405 | 2,111 | 2,371 | 2,347 | 2,312 | 2,512 | 2,454 | 2,565 | 2,474 | 2,487 | 2,338 | 2,306 | 28,682 | 24,658 |
| Louisiana-Arkansas | 585 | 578 | 610 | 435 | 480 | 547 | 584 | 629 | 626 | 678 | 548 | 565 | 6,865 | 6,287 |
| Rocky Mountain | 646 | 553 | 608 | 549 | 388 | 483 | 441 | 286 | 291 | 413 | 506 | 495 | 5,659 | 7,031 |
| California | 374 | 310 | 372 | 302 | 237 | 197 | 157 | 239 | 191 | 366 | 499 | 540 | 3,785 | 1,358 |
| Total | 8,874 | 7,979 | 8,704 | 7,663 | 7,714 | 7,957 | 8,355 | 8,482 | 8,314 | 9,035 | 8,980 | 9,167 | 101,224 | 93,736 |
| Texas-Louisiana Gulf Coast | 2,628 | 2,335 | 2,630 | 2,436 | 2,464 | 2,636 | 2,660 | 2,786 | 2,731 | 2,741 | 2,535 | 2,470 | 31,102 | 26,949 |

*Final figures.

**COMPARATIVE ANALYSIS, 1927**
(Thousands of barrels of 42 U. S. gallons, except for wax)

| | Jan. | Feb. | March | April | May | June | July | August | Sept. | Oct. | Nov. | Dec. | 1927 | *1926 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GASOLINE: | | | | | | | | | | | | | | |
| Production | 27,960 | 25,024 | 27,886 | 26,577 | 26,787 | 26,616 | 28,118 | 28,010 | 27,716 | 28,903 | 28,558 | 28,512 | 330,667 | 299,734 |
| Imports † | 520 | 416 | 493 | 377 | 490 | 590 | 190 | 348 | 516 | 365 | 417 | 282 | 5,003 | 5,540 |
| Exports † | 3,557 | 3,544 | 3,219 | 3,614 | 4,468 | 4,248 | 3,223 | 4,193 | 3,539 | 3,959 | 3,724 | 3,154 | 4,442 | 4,313 |
| Stocks | 46,058 | 49,714 | 52,410 | 52,379 | 48,609 | 43,768 | 39,069 | 33,455 | 29,738 | 29,550 | 30,401 | 32,323 | 32,323 | 39,023 |
| Day's supply ‡ | 67 | 64 | 63 | 58 | 49 | 41 | 37 | 31 | 28 | 31 | 32 | 37 | 34 | 47 |
| Domestic demand | 17,883 | 18,240 | 22,464 | 23,371 | 26,579 | 27,799 | 29,784 | 29,779 | 28,409 | 25,497 | 24,400 | 23,718 | 297,928 | 261,813 |
| KEROSENE: | | | | | | | | | | | | | | |
| Production | 5,113 | 4,453 | 4,802 | 4,608 | 4,663 | 4,303 | 4,484 | 4,420 | 4,686 | 4,884 | 4,824 | 4,869 | 56,114 | 61,768 |
| Imports † | ..... | 1 | 3 | 1 | 1 | 2 | ..... | 4 | ..... | 1 | 27 | 15 | 55 | 74 |
| Exports † | 1,616 | 1,399 | 1,351 | 1,861 | 1,633 | 1,616 | 1,276 | 1,700 | 1,659 | 2,211 | 1,821 | 1,227 | 19,480 | 22,248 |
| Stocks | 8,190 | 8,655 | 8,753 | 8,725 | 8,568 | 8,567 | 9,038 | 8,373 | 8,120 | 7,325 | 7,341 | 7,669 | 7,669 | 8,575 |
| Domestic demand | 3,882 | 2,590 | 3,356 | 2,776 | 3,188 | 2,695 | 2,637 | 3,389 | 3,280 | 3,469 | 2,514 | 3,819 | 37,595 | 38,140 |
| GAS OIL AND FUEL OIL: | | | | | | | | | | | | | | |
| Production | 32,936 | 30,185 | 32,377 | 31,856 | 33,499 | 31,691 | 33,693 | 34,098 | 32,339 | 34,045 | 32,594 | 33,029 | 392,342 | 365,195 |
| Imports † | 660 | 1,053 | 525 | 805 | 826 | 851 | 849 | 391 | 341 | 667 | 704 | 451 | 8,123 | 14,432 |
| Exports † | 3,732 | 3,812 | 3,657 | 3,825 | 4,544 | 4,278 | 4,047 | 4,639 | 4,258 | 4,206 | 4,013 | 3,828 | 47,339 | 38,351 |
| Stocks § | 23,195 | 22,099 | 22,561 | 23,732 | 26,059 | 26,590 | 28,890 | 30,346 | 31,631 | 33,191 | 33,637 | 31,982 | 31,982 | 24,898 |
| Stocks ‖ | 111,166 | 109,739 | 110,447 | 112,115 | 116,348 | 117,106 | 120,585 | 122,311 | 123,817 | 125,049 | 126,192 | 123,779 | 123,779 | 112,168 |
| LUBRICANTS: | | | | | | | | | | | | | | |
| Production | 2,570 | 2,345 | 2,754 | 2,615 | 2,625 | 2,571 | 2,672 | 2,752 | 2,762 | 2,757 | 2,477 | 2,801 | 31,721 | 33,292 |
| Imports † | 1 | ..... | 1 | 1 | 1 | 1 | ..... | 1 | ..... | 1 | ..... | ..... | 7 | 33 |
| Exports † | 864 | 620 | 895 | 763 | 863 | 758 | 993 | 754 | 861 | 839 | 798 | 802 | 9,810 | 9,435 |
| Stocks | 7,887 | 8,361 | 8,035 | 8,176 | 8,011 | 7,628 | 7,496 | 7,491 | 7,447 | 7,584 | 7,524 | 7,860 | 7,860 | 7,576 |
| Domestic demand | 1,396 | 1,251 | 2,186 | 1,712 | 1,928 | 2,197 | 1,811 | 2,004 | 1,965 | 1,782 | 1,739 | 1,663 | 21,634 | 22,568 |
| WAX (thousands of pounds): | | | | | | | | | | | | | | |
| Production | 54,114 | 47,363 | 53,544 | 48,917 | 46,267 | 44,938 | 47,979 | 41,576 | 47,886 | 49,476 | 48,146 | 54,039 | 584,347 | 645,815 |
| Imports † | 460 | 2,048 | 910 | 1,505 | 729 | 400 | 2,789 | 2,656 | 3,046 | 887 | 3,132 | 1,906 | 20,482 | 9,982 |
| Exports † | 29,228 | 23,623 | 28,206 | 25,421 | 25,228 | 24,200 | 25,970 | 34,229 | 31,780 | 28,342 | 32,541 | 30,569 | 339,336 | 235,584 |
| Stocks | 192,835 | 198,452 | 201,340 | 211,019 | 207,329 | 198,808 | 191,501 | 180,645 | 170,172 | 170,367 | 171,700 | 167,214 | 167,214 | 185,331 |
| Domestic demand | 17,842 | 20,171 | 23,461 | 15,322 | 25,458 | 29,659 | 32,105 | 20,859 | 29,621 | 21,826 | 17,404 | 29,862 | 283,590 | 251,274 |

* Final figures. † From Bureau of Foreign and Domestic Commerce. Exports, except for wax, include shipments to Alaska, Hawaii and Porto Rico. ‡Stocks divided by daily average domestic demand plus exports. § East of California. ‖ Includes stocks of heavy crude and fuel oil in California.

# Steel Mill Activity Above 85 Per Cent Of Plant Capacity

By B. E. V. Luty

PITTSBURGH, Pa., Feb. 27.—There is less divergence than there was a week ago as to the real state of the steel trade, as the feeling has been growing more general that steel conditions are not as good as they have been depicted in various quarters. To express the matter in a quantitative way, if the question be asked whether the total production of steel in the present half year is likely to be above or below that in the first half of last year the answer would be that it is more likely to be lower.

There is no issue as to the accuracy of recent reports as to rates at which steel mills have been running. Undoubtedly they have been running as well as was claimed, and they are of course shipping all their product, not accumulating any stock, while the buyers are content to receive the shipments. Fully a week ago the United States Steel Corp. reached a rate of producing steel of 91 per cent of capacity. Independents, with more liberal capacity ratings, did not reach as high a rate, but for the whole industry the rate has been well above 85 per cent, and there is no distinct decrease thus far.

Steel production since the first of the year is fully up to the average for the same period in the past few years, say the past three years. The issue is as to the future. It has been the regular thing for production to increase during the first three months of the year, and then to taper off somewhat. The question is whether the increase, which was working up to the middle of February, will continue through March. There are doubts whether it will, while there are chances that production in the second quarter of the year will be lighter than in the second quarter of other years. It remains the prospect that the half year will be better than the second half of last year, but that is the regular experience, a second half being usually lighter than a first half.

The automobile trade has been increasing in activity, but not to the extent expected. Some makers are doing well, better no doubt than they would if Ford production were not so light, Ford production having barely reached 1,000 a day even at the present time.

Fabricated structural steel, however, is doing well. The Department of Commerce has issued revised figures for the past three years, showing that 1927 was the record year in tonnage of fabricated structural steel lettings, instead of falling slightly below 1925 as previous reports had indicated. Lettings since the first of the year have been particularly heavy. Possibly this showing was due to fabricating shops having old contracts with mills for plain material at lower prices than can be done now.

In fact, the whole situation as to steel demand is confused by the various price advances of the past few months, the question being how much of the business now engaging the mills was driven in by the prospect of higher prices having to be paid, and how much steel business there will be henceforth, when the mills are insisting upon higher prices, in bars, shapes, plates, wire products, sheets and strips.

The tubular goods trade has been uneventful in the past week. Pipe mills continue operating at about 60 per cent, finishing up old orders for line pipe and expecting more, with a moderate demand for other oil country goods and a slowly increasing demand for standard or merchant pipe. Mill prices on pipe are well maintained. There is shading in the secondary market in a few sections, as there very frequently is.

## ENGINEERS REPORT ON WORTHAM, TEX., FIELD

A study of underground conditions in the Wortham oil field in Texas has been completed by the United States Bureau of Mines, Department of Commerce. The Wortham Field is situated in Limestone and Freestone Counties, along the line of the Mexia-Powell fault zone.

Wells in this field, like others drilled adjacent to the Mexia-Powell fault, started to show water in a comparatively short time. In many wells, the encroachment was so rapid that pumping equipment was severely taxed. The Bureau of Mines undertook a detailed engineering study of this field, and considerable time was spent in collecting data with special reference to the water problem and in analyzing results that had been obtained by the different operators in cementing back the wells. The benefits derived from bottom-hole plugging in the Powell Field suggested a plugging campaign at Wortham, which started in February, 1925, and resulted in a worthwhile increase in the oil production and a large decrease in water production.

The major conclusions drawn by the Bureau of Mines engineers from the study of the Wortham Field are as follows:

Wells completed immediately above the water contact in general have the highest initial production, and show water in large quantities at an early date. Wells completed some distance above the water contact are of smaller initial production, but are not menaced with serious water encroachment for a considerably longer period.

The rapid drilling of a field, with the consequent development of an enormous flush production, usually results in the sale of the product on a declining market, which may materially reduce the profit of the producer.

Close spacing of wells results in a high percentage recovery, which in its own light is of marked economic importance. The estimated recovery of 52 per cent of the oil is a material increase over what has in general been accepted as the recovery from other producing fields.

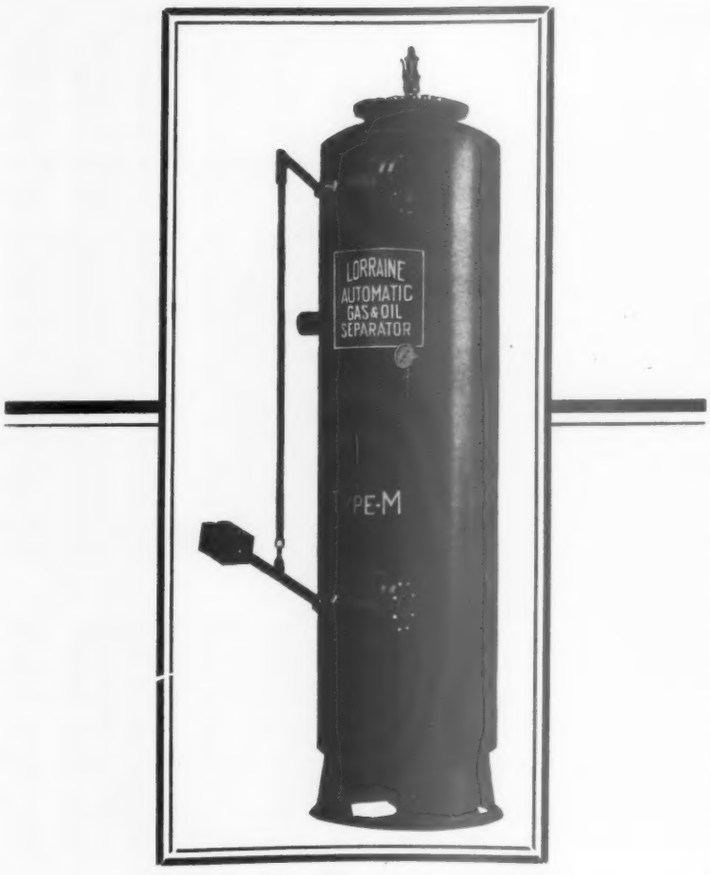
As a general proposition, bottom-hole plugging has been decidedly successful. More care should be exercised in the obtaining and preserving of both formation and production records.

The plugging of a well is a subject that must be carefully analyzed before work is commenced. The well can be damaged if due care is not exercised. The sooner a well is repaired after the appearance of water, the greater are the benefits to be derived from the work. No well should be considered as impossible of repair until reasonable evidence of failure is obtained.

Copies of the report, "Petroleum Engineering in Wortham Oil Field," by H. B. Hill and Chase E. Sutton, may be obtained from the United States Bureau of Mines, Department of Commerce, Washington, D. C.

## TEXAS OIL AND GAS CHIEF

AUSTIN, Tex., Feb. 25.—Appointment of Clifford L. Stone, lawyer of Jacksonville, to the $4,500-a-year job as chief of the oil and gas division of the State Railroad Commission was announced by the commission.

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## TESTS TO DETERMINE VALUE OF ROD-WAX

(Continued from Page 149)

deposition, which was at first in the surface lines at a distance from the well has since migrated to the casinghead, down the tubing, and is now below the standing valve and may even be in the surrounding sands.

1. Steam and Gas in Surface Lines: In the early productive life of the Salt Creek Field flow lines were cleaned throughout the year by steaming them or applying high pressure gas. Recently this method has been used only during the colder months.

2. Paraffin Hooks: A swab or paraffin hook has been used to clean casing or tubing. This method is discussed in detail in a paper by Reistle[5].

3. High Pressure Pops: Pops releasing at 75 pounds were placed on the flow lines at the tank batteries in certain districts during the period of heavy deposition of paraffin in these lines. The greatly reduced deposition under these conditions was undoubtedly due to the paraffin being held in solution by the increased amount of gas in solution in the oil.

4. Electric Heaters: Electric heaters have been tried in certain wells. It has been found that in wells producing 30 bbls. or more per day there has been no appreciable increase in production whereas in some of the smaller wells increases varying from 50 to 800 per cent have been reported. Since this work is still in the experimental stage it can not be definitely stated that the increase has been due to the removal of paraffin from the face of the sand, as it may have resulted from the reduction in viscosity of the oil due to increase in temperature. Electric heaters have been described by Peake and Prior[6] and by Reistle[7].

**Steaming Tried**

5. Steaming: Experiments were conducted to determine the effect of steaming wells at high temperatures and pressures. Steam was introduced into the well from a Baker boiler capable of delivering steam to the casinghead at 1,000 pounds pressure and 1,100 degrees. The wells were tubed with a regular pump string and the steam was introduced through a three-quarter-inch line within an auxiliary 2-inch string which served as a heat insulator. The lower end of the three-quarters-inch tubing was plugged, with perforations immediately above to direct the steam against the walls of the well. Oil, condensed steam, sand, and basic sediment were pumped from the well while steaming was in progress. The steam was delivered at the casinghead for 8 to 16 hours at pressures varying from 700 to 1,000 pounds and temperatures varying from 700 to 1,100 degrees. Maximum thermometers and sealed glass tubes containing salts of known melting points were placed near the bottom of the pumping string. The temperature of the pumped fluid at the casinghead was recorded during steaming and was found to approximate 200 degrees. The temperatures at the bottom of the hole averaged 200 to 220 degrees. This process has proven more adaptable to wells suffering from mud conditions than those which appeared to have paraffin trouble.

6. Thermit: Thermit shots were employed on a number of wells with no apparent increase in production, with one exception. Thermit consists of an intimate mixture of powdered aluminum and ferric oxide, which, when ignited, form aluminum oxide and metallic iron, the temperature of the reaction being approximately 5,000 degrees. The method of handling the shot is similar to that used in shooting with nitroglycerin. The temperature at the bottom of the well was increased to only 120 degrees, which was not sufficient to melt the paraffin.

**Hot Water Tried**

7. Hot Water: Forty barrels of boiling water were introduced into the casing of a well. In dropping from the surface to a depth of 1,900 feet the water cooled to 114 degrees, indicating that boiling water cannot be introduced at the surface and reach the sand at a temperature sufficiently high to melt paraffin. By circulating hot water the temperature at the sand might be raised to the melting point of the paraffin.

8. High Pressure Gas: Experiments have been conducted with gas under 200 to 300 pounds pressure. This gas was introduced through the tubing and returned through the casing. While a considerable amount of material was blown from the well there is no record of any increase in production as a result of this treatment.

9. Reflux Gasoline: Before the laboratory work on paraffin was completed a noncommercial grade of very highly volatile gasoline from the weathering plant at the Midwest Gas plant was introduced into the wells between the casing and tubing. No increase in production followed this treatment. After the laboratory work was completed this practice was discontinued, as it was established that gasoline at ordinary temperatures, would not dissolve a sufficient quantity of paraffin to be of any practical value.

In summing up the results of the experiments outlined above the electric heater has proven the most effective in increasing oil production. It cannot be said, however, that experiments which have been unsuccessful in the Salt Creek Field will not alleviate troublesome conditions in other fields.

[5]United States Bureau of Mines report of investigations, Serial No. 2,802.
[6]Electrification of the Salt Creek Field. A.I.M.E., 1927.
[7]Technical Publication, No. 36. A.I.M.E., 1927.

## CANADA TO INVESTIGATE OIL-FROM-SHALE PROCESS

CHATHAM, Ontario, Feb. 27.—Following a discussion in the Dominion Parliament at Ottawa on a resolution introduced by Dr. T. E Kaiser, M.P., for South Ontario, announcement was made by Charles Stewart, minister of mines, that steps would be taken looking toward the further investigation of the possibilities of producing oil from Canadian bituminous coals and lignites.

A resolution ultimately passed stated "that in the opinion of this house the government should consider the advisability of taking steps to bring about the utilization of our deposits of lignite and bituminous coal by conversion into crude oil and other valuable commodities."

Doctor Kaiser outlined some of the scientific work done upon coal liquefaction in Great Britain, and urged the government to send samples of Canadian coals to the University of Birmingham, to send young Canadian scientists overseas, and to bring out to the University of Saskatchewan some British experts in this line. Discussing the proposals Mr. Stewart said in part:

"I will make the prediction that within 10 years there will be no raw fuel burned in Great Britain. All the ingredients of value will be extracted and the residue will be a fuel that will be smokeless and thus obviate the difficulty they have with fogs in London to a large extent.

"There are unlimited possibilities in at least three or four of these experiments which are being conducted. I do not suggest that the processes have yet emerged from the experimental stage, notwithstanding the fact that in Germany they have spent a great deal of money. The experiments in the liquefaction of coal are being conducted on a very large scale.

"In six or eight plants that we visited last summer in Germany, not all of them were engaged in liquefaction, some of them going in for low temperature carbonization. In every one of the 10 or 15 in Great Britain I found samples of Alberta coal which had been submitted by various interested parties, and I do not recall a single plant where experimental work was being done in which we did not find samples of our own coal, either from Alberta or Nova Scotia.

"In the very plant which I have been discussing, at Luna, Germany, we found samples. I would not limit to 100 pounds the coal we should submit for testing purposes. I am willing to send it in ton lots at the expense of the Federal Government to any plant which is prepared to test it, and I am sure that the result will be beneficial not only to those directly interested but also to the country at large."

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Either Flat or Cable Chain

9 sizes for 1/8 to 18" pipe

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Consider "Vulcan" construction. Wholly made from wrought steel; jaws drop-forged and fastened to the handle with extra size throughbolt and U. S. Standard nut; chains proof-tested and CERTIFIED. The entire tool is built for years of toughest service. The next time you order tongs, specify "Vulcan." Years from now, you'll say "I made a *real buy* that time."

Literature?

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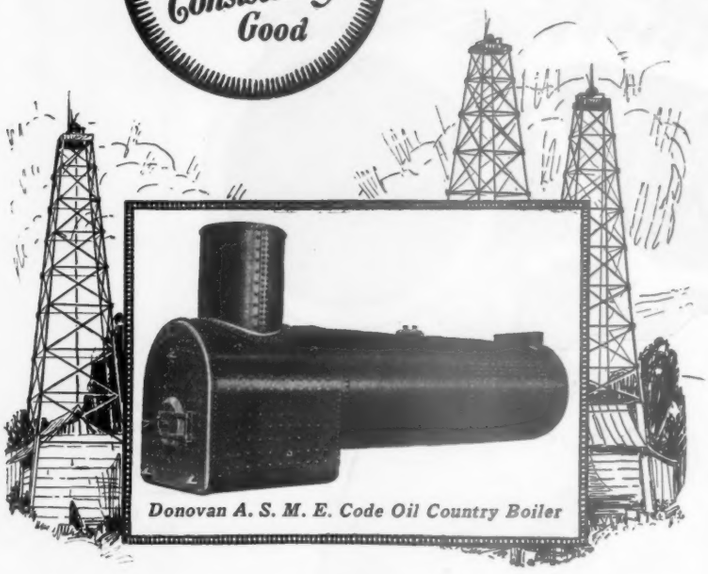

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*"We are not only very well pleased with the DONOVAN boilers, but beyond this important fact, we find that when you promise a delivery, it is made by the time promised, or before in most cases. We can count on your promises and it is a pleasure to know that we are not being 'strung along' as many others usually do."*

Even tho' it means losing business once in a while, we feel that boiler buyers would rather have facts than foolishness. Naturally, it hurts to lose business but we feel that this policy is right. The results have justified it many times over.

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## COLOMBIA CAN PRODUCE 150,000 BBLS. A DAY

By L. G. Huntley*

The entire production in Colombia during 1927 was that from the Tropical Oil Co. concession. Production was approximately 14,000,000 bbls., of which 12,081,000 bbls. were exported from the Mamonal terminal of the Andian National Corp. near Cartagena. The balance represents that refined and used or marketed within Colombia.

As production in 1926 was only 6,443,540 bbls., the increase has been more than 100 per cent. This is partly due to the looping of the pipe line from the concession to the coast, and the resultant increase in capacity to 50,000 bbls. per day, and also to increased domestic sales. The refinery at Barranca has been doubled in capacity, and it is understood is now handling 5,000 bbls. of crude daily. This gives the producing field a potential outlet of 55,000 bbls. daily. The Tropical Oil Co. completed 82 wells in 1927, with 1 well abandoned for drilling difficulties. The average daily initial production was 1,136 bbls. per well. The largest well is reported to be No. 173 La Cira, rated as 5,000 bbls. initial. Most of the wells were drilled on the Infantas and La Cira structures, the latter located en echelon to the northwest of the main Infantas anticline, and separated from it only by a low saddle. Drilling operations on the Llanos fold, also en echelon with Infantas but to the southeast, and at San Luis, bearing about the same relationship to the Umir Hills uplift, are still more or less in the exploratory stage.

The four structures mentioned cover approximately 15,000 acres, on which there are at present 223 producing wells. Drilling has been better than 92 per cent successful since starting operations on this concession. Allowing 15 acres per well, which is 50 per cent more than good practice in the Mid-Continent fields, there is thus room for 1,000 wells, which at the recent rate is a 10-year drilling campaign. This does not take into consideration the known deeper oil zones, which have not been prospected, but which are uniformly petroliferous at their outcrops to the eastward.

It is estimated that with the enlarged pipe-line capacity, as well as increased domestic consumption, the production for this country will be about 20,000,000 bbls. for the current year of 1928. It is possible that if opened up the field could produce approximately 150,000 bbls. per day.

No other production was developed elsewhere during the past year. The Standard Oil Co. of California is drilling three wells along the coastal belt. The Gulf has one well standing idle on the Colombia Syndicate properties in the Lebrija district, is drilling one well on the Leonard property, and clearing and roadmaking for two more on this latter property east of Puerto Wilches. The Lobitos Oilfields are drilling one well on the Cortizos property northeast of Infantas.

*Before A.I.M.E. New York meeting. Copyright, 1928, by American Institute of Mining and Metallurgical Engineers, Inc.

## WEST TEXAS PRODUCTION NOW DOMINANT FACTOR

By A. R. Dennison*

In the Texas Panhandle division, four new small producing areas were developed which were not sufficient to halt the decline in the daily average production. Several new discoveries were made, notably in Moore and Gray Counties, which may develop into oil fields in 1928. The gas area was further defined and new pipe lines were begun which will make extensive use of the gas reserve. The Panhandle division will continue to be a major field in 1928, but will not produce as much oil as in 1927 unless the market improves enough to stimulate prospecting.

Three discoveries of 1926, Church-McElroy, Yates and Hendricks, were developed into major pools of high initial production in 1927, one of which (Hendricks) is still largely undefined. Two discoveries, Gulf Oil Co.'s No. 1 Waddell, Crane County, and Llano Oil Co.'s No. 1 Scarborough, Winkler County, were made which may develop into major pools. Several of the old fields were revived by extensions, notably McCamey. Deeper production is indicated both in the "Big Lime" and below the "Big Lime." The price of West Texas crude was reduced in August to a figure which requires gusher production in order to operate at a profit. This reduction in price has not seriously retarded prospecting or the development of the pools.

West Texas gross production will be limited only by the ability to handle the oil. At its present daily average, it would produce 100,000,000 bbls. of oil in 1928, and with adequate outlets could exceed this figure. Two pools, Yates and Hendricks, hold the key to the situation. They have a combined proven territory in excess of 20,000 acres, within which many locations remain to be drilled. Prospects are good for the opening of other pools in territory which may necessitate competitive drilling and, therefore, result in a rapid increase of the daily average production. Present indications are that West Texas will continue the dominant factor in the industry of the State for the current year, and it may conceivably dominate the entire Mid-Continent as well.

*Before A.I.M.E. New York meeting. Copyright, 1928, by American Institute of Mining and Metallurgical Engineers, Inc.

## CALIFORNIA RECEIPTS AND PETROLEUM IMPORTS

Imports of crude and refined oils at the principal United States ports for the week ended February 18 totaled 1,864,000 bbls., a daily average of 266,286 bbls., compared with 1,496,000 bbls., a daily average of 213,714 bbls. for the week ended February 11, and a daily average of 247,107 bbls. for the four weeks ended February 18.

| At Atlantic Coast Ports— | Feb. 18 |
|---|---|
| Baltimore | 197,000 |
| Boston | ..... |
| New York | 990,000 |
| Philadelphia | 298,000 |
| Others | 141,000 |
| Total | 1,626,000 |
| Daily average | 232,286 |
| At Gulf Coast Ports— | |
| Galveston district | ..... |
| New Orleans and Baton Rouge | 179,000 |
| Port Arthur and Sabine district | ..... |
| Tampa | 59,000 |
| Total | 238,000 |
| Daily average | 34,000 |
| At all United States Ports— | |
| Total | 1,864,000 |
| Daily average | 266,286 |
| Daily average four weeks ended | 247,107 |

**Receipts of California Oil at Atlantic and Gulf Coast Ports**

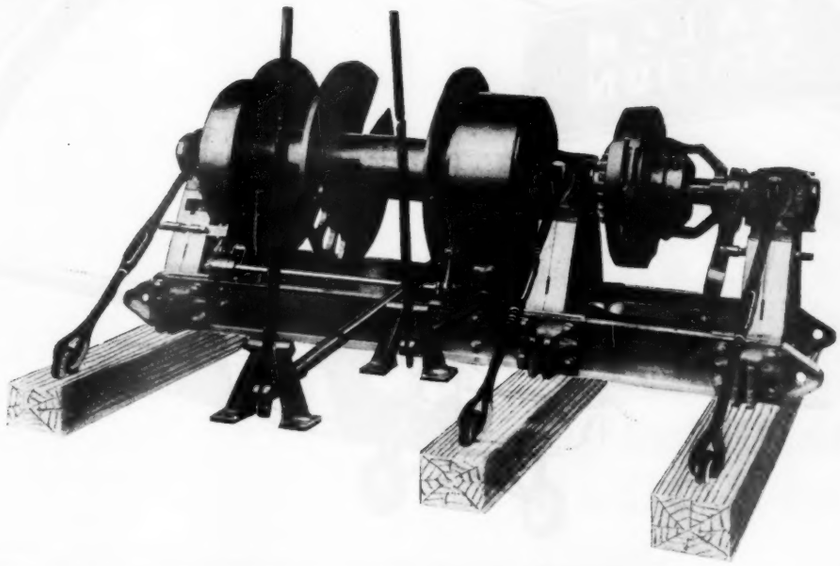
Receipts of California crude and refined oil at Atlantic and Gulf Coast ports for the week ended February 18 totaled 607,000 bbls., a daily average of 86,714 bbls., against 639,000 bbls, a daily average of 91,286 bbls. for the week ended February 11, and a daily average of 62,179 bbls. for the four weeks ended February 18.

| At Atlantic Coast Ports— | Feb. 18 |
|---|---|
| Baltimore | 88,000 |
| Boston | ..... |
| New York | 317,000 |
| Philadelphia | 123,000 |
| Others | 79,000 |
| Total | 607,000 |
| Daily average | 86,714 |
| At Gulf Coast Ports— | |
| Daily average | ..... |
| Total Atlantic and Gulf Coast Ports | 607,000 |
| Daily average | 86,714 |
| Daily average four weeks ended | 62,179 |
| Distribution of total California receipts is as follows: | |
| Crude | 169,000 |
| Gasoline | 287,000 |
| Kerosene | ..... |
| Gas Oil | 151,000 |
| Lubricating | ..... |
| Total | 607,000 |

## LIGNITE VERSUS GAS

AUSTIN, Tex., Feb. 25.—Representatives of lignite producing interests petitioned the State Board of Control for a hearing before action is taken on the board's proposal to use natural gas hereafter as fuel at Texas A. and M. College, the University of Texas and Prairie View College. R. B. Walthall, board chairman, indicated the request will be granted.

# another MARION TRIUMPH ! ! ! ! !



## MARION HEAVY DUTY CHAIN DRIVEN SAND REEL

A complete, self-contained Sand Reel, with three bearings. It is mounted on steel frame, ready to bolt down to sills. The drive sprocket wheels are keyed to the crank shaft.

The clutch is a heavy double disc type and very powerful, 26" in diameter with asbestos lined discs. The clutch has only one adjustment and can easily be regulated in five minutes.

The clutch drum is mounted on Timken Roller Bearings and requires very little attention.

The clutch is driven by 2" pitch high speed hardened steel roller chain. The service brake is 30" in diameter by 12" face. The brake band lining is ¾" thick, made of metallic asbestos block. This brake is operated by the clutch lever—moved in one direction for the clutch and in the opposite direction for the brake.

There is only one clutch in the Reel and the clutch discs can be removed or changed in two hours.

The Sprocket wheel is split so it can be replaced by removing only six nuts.

The Clutch is perfectly balanced. No vibration when running at high speed.

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The reel is bolted to the sills with six anchor bolts and braced with six turnbuckle rods.

A perfectly balanced Reel for deep wells and high speed.

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| BRECKENRIDGE, TEXAS | SCOTTDALE, PA. | LULING, TEXAS | SALT CREEK, WYO. |
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MAKING THE AIR SAFE FOR HUMANITY . . .

## KANSAS WILDCATS

(Continued from Page 52)

Barnsdall Oil Co. No. 1 Russell, NE cor NW SE Sec 15-33-4 ..... Rig.
Derby Oil Co.'s No. 1 Seaman, NE cor. SE NE Sec. 22-30-3 ..... Drilling 2,712 ft.
John Herron and others' No. 1 Marshall, SW cor. NE Sec. 36-30-6 ..... Shut down 470 ft.; legal trouble.
Meridian Gas Co.'s No. 1 Roselle, SW cor. SE Sec. 8-35-1.. Drilling 1,835 ft.
Otstot et al's No. 1 Volker, NW cor. NE. Sec. 9-35-1 ... Rig.
Harris & Hahn's No. 1 Gamble, C NW NW Sec. 17-35-3 ..... Shut down 1,400 ft.
E. B. Shawver and others' No. 1 Disser, NW cor. NW Sec. 10-34-3 ..... Fishing 1,426 ft.
Vickers Petroleum Co.'s No. 1 Daniels, NE cor. NW Sec. 3-30-3 ..... Shut down 1,800 ft.
E. B. Shawver No. 1 Mullett, C NW SE Sec. 31-34-3; gas rights only ..... Spudded and shut down.

**DICKINSON COUNTY**

Harwood & Winters' No. 1 Utech, SW cor. SE NW Sec. 35-16-4 ..... Drilling 2,416 ft.
McBride & Goens' No. 1 Shirley, NE cor. SW Sec. 21-12-4 ..... Shut down 2,120 ft.

**ELLIS COUNTY**

J. H. Tatlock et al's No. 1 Leiker, NW cor. NE NE, Sec. 26-13-16w ..... Sand, 3,237-40 ft; 10 bailers of water; shut down.
R. H. Hood and others' No. 1 Butler, C SE SE Sec 15-26-11 Machine.

**GRAHAM COUNTY**

Gulf Coast Oil Co.'s No. 1 Johnson, SE cor. NE SW Sec. 27-8-25w ..... Shut down 3,270 ft.

**GREENWOOD COUNTY**

Carnes & Bly's No. 1 Smith, NE cor. SE Sec. 4-24-13 ... Drilling 1,150 ft.
O. W. Culp's No. 1 Smith, C NE SE Sec. 28-27-13 ..... Dry and abandoned 1,575 ft.
Eureka Oil Co.'s No. 1 Brothers, SE cor. NW Sec. 35-23-11 ..... Drilling 2,411 ft.
C. A. Devine's No. 1 Bradford, SW cor. NE Sec. 22-26-11 ..... Shut down 600 ft.
C. E. Hawks' No. 1 Lessman, SE cor. SW Sec. 14-21-10 . Shut down 1,720 ft.
T. C. Johnson's No. 1 Knox, NE cor. NW Sec. 8-23-13 ....Shut down 1,705 ft.
Kismet Oil Co.'s No. 1 Richardson, SW cor. NE SW Sec. 26-22-11 ..... Location.
Sharpless and others' No 1 Corder, SW cor. SE SE Sec. 22-23-12 ..... Shut down 1,310 ft.
Smith & Rockhill's No. 1 McDair, NW cor. SE. Sec. 20-26-12 ..... Drilling 1,175 ft.

**HARPER COUNTY**

Barbara Oil Co.'s No. 1 Blunk, C NW NE Sec. 20-34-13w.. Drilling 1,610 ft.
Amerada Pet. Corp.'s No. 1 Mendiville, C SE SE, Sec. 24-34-6w ..... Drilling 4,370 ft.
Sam Jarvis' No. 1 Wyckoff, SW cor. NW Sec. 11-34-4w. Rigging up 4,212 ft.
Sam Jarvis' No. 1 Warneke, SE cor. SW sec. 4-34-3w....Shut down 4,207 ft.
Gypsy Oil Co.'s No. 1 Douglas, NE cor. SE NW Sec. 23-34-2w ..... Top Wilcox, 4,493 ft; T.D., 4,586 ft; est. 200 bbls; S.D.

**JEFFERSON COUNTY**

Wichita Oil Co.'s No. 1 Simpson, NW cor. SW SW Sec. 19-10-17 ..... Rigged up and shut down.

**KINGMAN COUNTY**

James Madison's No. 1 Ballein, SW cor. NW NW Sec. 21-28-5 ..... Drilling 3,523 ft.

**LANE COUNTY**

Robinson and others' No. 1 Dickerson, SW cor. NW SE Sec. 11-18-27w ..... Cleaning out 2,645 ft.

**LOGAN COUNTY**

W. H. Koons', Trustee No. 1 Edwards, NW cor. NW Sec. 14-14-33w ..... Shut down 4,310 ft.

**MARION COUNTY**

Anderson Brothers' No. 1 Benth, SE cor. SW SW Sec. 31-18-5 ..... Fishing 1,920 ft.
Givens and others' No. 1 Ucker, SW cor. NE Sec. 31-17-4 ..... Underreaming 1,820 ft.
Sun Ray Oil Co.'s No. 1 Lehrman, SW cor. NE SE Sec. 1-18-1 ..... Fishing bailer 2,750 ft.

**MEADE COUNTY**

Blackwell Oil & Gas Co.'s No. 1 Boyer, SE cor. NW SE Sec. 9-33-28w ..... 8-in. casing 3,205 ft.; total depth 3,315 ft.; shut down

**MORRIS COUNTY**

Fisher & Louck's No. 1 Stroda, NW cor. SE Sec. 6-16-5 ..... Drilling 1,875 ft.
Graham Brothers' No. 1 Nelson, NE cor. SE Sec. 30-17-5 ..... Shut down 750 ft.
Moss & Nelson's No. 1 Smith, SW cor. SW Sec. 18-16-5 .. Rig.
Skelton and others' No. 1 Iles, NW cor. NW Sec. 25-16-5 ..... Rig.

**McPHERSON COUNTY**

Franks and others' No. 1 Wright, SW cor. NW NW Sec. 9-19-4 ..... Rig.
D. I. Hall's No. 1 Gray, NW cor. SE NW Sec. 20-20-3w ..... Spudded and shut down
C. W. Lamer's No. 1 Lamer, SE cor. SW Sec. 1-17-3w .... U.R., 3,495 ft.
The Texas Company's No. 2 Chinberg, NW cor. NE NW Sec. 32-18-2w ..... Underreaming 2,270 ft.
Danciger Oil Co.'s No. 1 Willem, NW cor. SE SE Sec. 6-22-4w ..... Rig and tools.

**OSBORNE COUNTY**

Prather-Davis-Krueger's No. 1 Pruter, SW cor. SE Sec. 30-9-15w ..... Shut down 2,360 ft.

**PAWNEE COUNTY**

Frank Hopper and others' No. 1 Seifers, NW cor. SW NE Sec. 33-21-11w ..... Drilling 3,438 ft.
F. C. Troupe's No. 1 Lovett, C EL NE NE Sec. 31-21-16w ..... Rig.

**POTTAWATOMIE COUNTY**

J. J. Crawford's No. 1 College, C W L SW NE Sec. 11-10-12 ..... Shut down 2,250 ft.

**RENO COUNTY**

Danciger Oil & Refining Co.'s No. 1 Williams, NW cor. SE SE Sec. 6-22-4w ..... Drilling 450 ft.
Stearns-Streater & Marshall's No. 1 Crabb, SE cor. SW NE Sec. 1-25-8w ..... Rig.

**RICE COUNTY**

Allison & Fitzwilliams' No. 1 Poland, NE cor. SW NE Sec. 36-19-8w ..... Cellar.

**RILEY COUNTY**

Mutual Oil Co.'s No. 1 Marks, SE cor. NE NW Sec. 26-10-6 ..... Shut down 2,400 ft.

**ROOKS COUNTY**

Keys Petroleum Co.'s No. 1 Rathburn, NE cor. SW Sec. 14-9-16w ..... Shut down 1,350 ft.
Krueger and others' No. 1 Poore, NE cor. NE Sec. 14-8-16w ..... Spudded and shut down
Stearns & Streater's No. 1 Matheson, NE cor. SE NW Sec. 28-10-16w ..... Drilling 3,431 ft.

**RUSH COUNTY**

Valerious & Chenney's No. 1 Sheverman, NW cor. SE NW Sec. 27-17-17w ..... Spudded and shut down

**SALINE COUNTY**

Cress & Hawkey's No. 1 Grendler, NE cor. SE Sec. 16-15-5 ..... Rig.
Hugh Faulders' No. 1 Wendt, SW cor. SE SE Sec. 18-15-5 ..... Rig.
Menta Oil & Gas Co.'s No. 1 Muir, SW cor. SW Sec. 17-15-2w ..... Underreaming 3,205 ft.

**SEWARD COUNTY**

T. B. Slick's No. 1 Pyle, NE cor. NE Sec. 14-33-33w... Drilling 1,350 ft.

**SHERMAN COUNTY**

A. L. Henson and others' No. 1 Murry, NE cor. SE NW Sec. 22-7-4w ..... Shut down 2,650 ft.

**SMITH COUNTY**

Smith & Buchner's No. 1 Rice, SW cor. SW Sec. 18-5-15w ..... Rig.

**STAFFORD COUNTY**

Randall-Johnson's No. 1 Richardson, NW cor. SW Sec. 24-22-11w ..... Rig on ground.
Kismet Oil Co. No. 1 Richards, SW cor. NE SW Sec. 24-22-11w ..... Location.

**WAUBANSEE COUNTY**

Empire Gas & Fuel Co.'s No. 1 Schuaem, SE cor. SE Sec. 19-12-11 ..... Fishing 3,320 ft.

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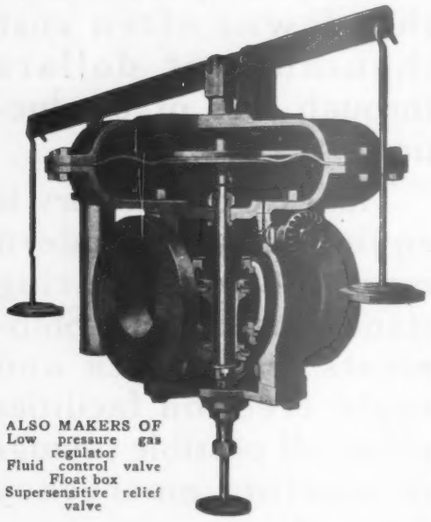

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## SURVEY OF SOURCES OF MOTOR FUELS

(Continued from Page 92)

heavier fractions of petroleum oil are converted into gasoline continues to improve slowly but steadily with resultant lower conversion costs and better yields. As the one real source of automotive fuel, the position of crude petroleum in the world at large was never so nearly unassailable, from a cost and supply standpoint, as at the present time. At the same time there is now a keener realization than ever before of the true economic value of petroleum and of the necessity for exercising good sense in the exploitation of the known reserves. Abundance of supply in sight is not accepted as a justification for wasteful production methods or uneconomic use.

### Shale

The technical possibilities of shale as a source of automotive fuel remain substantially in the status to which they were advanced some 5 or 6 years ago following a period of higher prices in the petroleum market. Reserves of oil-bearing shale, in the United States especially, are determined with a reasonable degree of accuracy and are known to be far in excess of any present foreseeable requirement, even assuming that shale were compelled to carry the whole load of supplying the automotive market. However, the costs and difficulties attendant upon the mining and distillation of shale and in the refining of the crude product, coupled with the fact that shale reserves are in local competition with low cost petroleum supplies, prevent any active efforts to develop these sources of supply commercially. The amount of technical investigation which shale oil production is now receiving is probably less than at any time in the last 10 years.

### Coal

On the other hand, coal as a source of supply of automotive fuel has forged to the front very rapidly during the last three years. A great coal hydrogenation plant has been completed at Merseburg, Germany, by the I. G. Farbenindustrie A. G., and is now well started on commercial operations. The coal used is a low grade lignite or brown coal, which is produced locally by the most modern labor saving strip-mining methods. The motor fuel produced is of good marketable quality, not readily distinguishable from gasoline derived from crude petroleum. Those of us who have had the privilege of visiting this wonderful industrial development at Leunewerke leave with the feeling that the applied sciences of chemistry and engineering can face the future with calm assurance in the conviction that the world will never want for automotive fuel at a reasonable price so long as coal is available. Through hydrogenation the coal reserves of the world are now also its oil reserves, not directly quantitatively but nearly enough so that the general statement is true for the purpose of this discussion.

### Synthetic Fuels

About coincident in time with the commercial development of the coal hydrogenation methods in Germany there has been a scientific and limited commercial development along two other lines, i. e., the synthesis of a complex organic combustible liquid known as synthol from water gas by Dr. Franz Fischer (so far only an experimental achievement), and a direct and simple synthesis of methanol from the same raw material by the I. G. Farbenindustrie A. G. which is commercial. By these two methods, both of which require preliminary gasification, coal becomes a supplementary source of motor fuel.

The direct extraction of light hydrocarbons ranging from propane to hexane from natural gas accounts for something like 11 per cent of the present motor fuel supply of the United States. Both qualitatively and quantitatively this is a desirable supplement to gasoline derived directly from crude petroleum. Its qualitative supplementary value is somewhat affected by the increased use of cracking processes, which may be viewed as a sort of man-made duplication of nature's processes.

### High and Low-Temperature Coal Distillation

The coal distillation art divides itself naturally into two branches, the present commercial high-temperature distillation which yields metallurgical coke, gas, and a small fraction, perhaps 1 to 2 gallons per ton of light oils useful for motor fuel purposes, and low-temperature distillation processes, yielding so-called smokeless fuel intended for general consumption as a substitute for natural coal and up to 15 gallons per ton of combustible liquids of distinctly poor qaulity as compared with crude petroleum.

The high-temperature distillation process is of course represented by the conventional by-product coke oven and through its induction of benzol, has an established permanent place, although a minute one, in the motor fuel picture. The low-temperature distillation art suffers from a severe handicap at every step. No commercial development of apparatus or process seems to be quite satisfactory or even satisfactory enough to invite capital in any large amounts for further development. The character of the oil product has been referred to. The public reaction to the solid product which must remain the principal product of the process is not accurately known. For these reasons any conservative estimate of the low-temperature distillation art necessarily places this in the list of supplementary rather than primary sources of motor fuel.

### Alcohol as a Supplementary Fuel

The production of ethyl alcohol by fermentation is an established supplementary source of supply of motor fuel. At one time a very large proportion of the motor fuel sold in Havana, Cuba, consisted of a mixture of 90 per cent ethyl alcohol to 10 per cent gasoline. In Central America, in the Philippines and Hawaii and some other isolated spots ethyl alcohol is reported to have been sold commercially as a motor fuel, admixed with gasoline or ether, or with both. The French national carburant, as defined by law, consists of a mixture of gasoline and dehydrated ethyl alcohol, dehydration being necessarily resorted to in order that the mixture might be made with a sufficient proportion of gasoline present to give even reasonably satisfactory performance in existing engines. The effort to secure any really commercial distribution of this fuel has been abandoned however.

Substantially all of the alcohol which has gone into the motor fuel markets on a commercial basis has been that obtained from the fermentation of cane molasses, at times and at places where the latter had no other market. Inverted starch, the regular distillers' mash, has supplied a small amount of alcohol to the motor fuel trade. Proposals for the production of alcohol from cellulose and miscellaneous vegetable products have been experimentally demonstrated but have never amounted to a commercial business as far as is known.

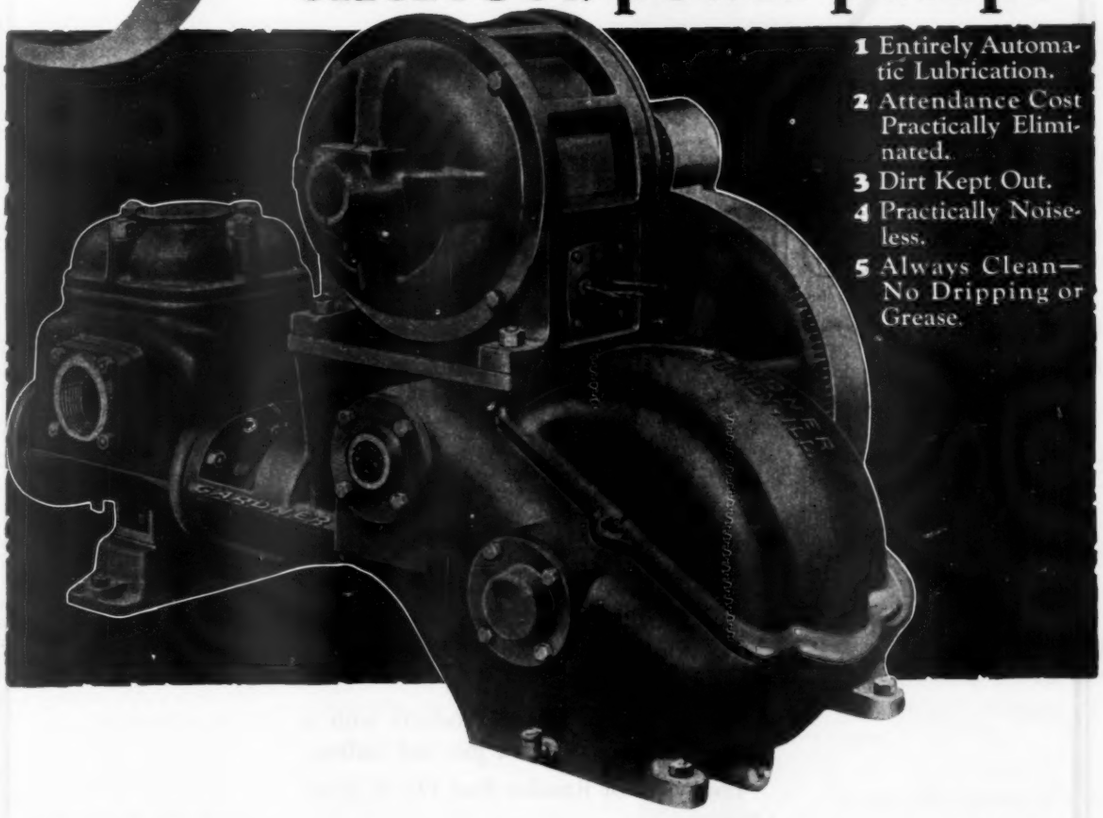
### Conclusions

The general conclusion from this brief survey of a field which has unlimited technical possibilities both from the engineering and chemical side is the following:

Gasoline or its equivalent must be considered synonyomous with automotive fuel for the present day and for the foreseeable future. Crude petroleum, shale and coal exist in the requisite quantities to provide singly or in combination an indefinitely large supply for the future. With the conclusion of the year last past the third of these primary sources has become definitely established as a practical source for a satisfactory product, at a reasonable cost. Supplementary sources in the order of their importance are natural gas, by-products from coal distillation and fermentation of alcohol.

This summary ignores established technical possibilities, and even some important commercial but small acheivements, such as methanol synthesis, but it is believed to be a reasonably complete engineering review of the picture.

# 5 Advantages of GARDNER-DENVER enclosed power pumps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## WILDCAT OPERATIONS IN OKLAHOMA

(Continued from Page 50)

McCray Oil & Gas Co.'s No. 1 Whitney, NE cor. NW SE Sec. 19-24-14w ..... Shut down 1,880 ft.

**KAY COUNTY**

Boucher and others' No. 1 Cooper, SE cor. SE Sec. 23-27-2w ..... U.R. casing 1,350 ft.
Ponca Lee Oil's No. 1 McNeil, NW cor. NE Sec. 32-26-2e.. Shut down 2,795 ft.
Tonkawa Development Co.'s No. 1 McDaniels, SE cor. SE Sec. 15-25-1w ..... 500,000 ft. gas; 3,980-88 ft.; shut down, 4,475 ft.
Miller & Geyer's No. 1 Albright, NW cor. SE Sec. 10-25-1 ..... Drilling 4,092 ft.
Corley and others' No. 1 Williams, SE cor. NE SW Sec. 7-21-1w ..... Shut down for casing 1,920 ft.

**WOODWARD COUNTY**

Otstot Development Co.'s No. 1 Simmons, SE cor. SE Sec. 32-24-17w ..... Shut down for pipe 1,490 ft.
Wight & Wahl's No. 1 Williams, C NW Sec. 16-23-20w... Rig.
Randau & Mooney's No. 1 Parker, SE cor. NE NW Sec. 4-23-16w ..... Shut down 1,092 ft.
Sharon Oil Co.'s No. 1 Elmore, SW cor. SW Sec. 26-21-21w ..... Shut down 2,772 ft.
Burgoyne Brothers' No. 1 Barnes, SW cor. SE NE Sec. 15-21-19w ..... Drilling 700 ft.
Wight & Wall No. 1 James, C NW Sec 16-23-20w..... Rig.

**GARFIELD COUNTY**

E. L. Love and others' No. 1 White, SE cor. NW Sec. 9-24-6w ..... Hole full water 4,650 ft., shut down 4,720 ft.
Failing and others' No. 1 Gorsuch, SE cor. SE Sec. 14-24-3w ..... Drilling 4,485 ft.
Fleming and others' No. 1 Wengert, NW cor. NW Sec. 3-22-5w ..... Shut down 750 ft.
Beopple and others' No. 1 Schweer, C SW NE Sec. 12-21-4w ..... Shut down 1,850 ft.
Marland and Barnsdall's No. 1 Looman, NE SE Sec. 9-26-4w ..... Fishing 5,740 ft.
Marland Oil Co.'s No. 1 Miller, SW cor. SW Sec. 12-20-4w Shut down 4,586 ft., waiting on test Sec. 9-20-4w.

**ELLIS COUNTY**

Oklahoma Northern's No. 1 Young, NW cor. NW Sec. 9-21-25w ..... Fishing 300 ft.

**NOBLE COUNTY**

Barnsdall Oil Co.'s No. 1 Bumberger, NE cor. NW SE Sec. 11-21-1 ..... Cellar.

**KINGFISHER COUNTY**

Slick & Harrington's No. 1 Cromer, SE cor. NE NE Sec. 25-19-6w ..... Location.
H. H. Morgan's No. 1 Buscon, SW cor. SE NE Sec. 30-16-9w ..... Shut down 1,610 ft.
Petroleum Research Core Drill Corp.'s No. 1 Wolff, NW SE Sec. 4-16-7w ..... Shut down 800 ft., litigation; may start soon. Moved out all but rig.
McKinney & Crawford's No. 1 Sturgeon, NE cor. SW Section 27-16-6w ..... Shut down 3,804 ft.
Wiley & Manahan's No. 1 Johnson, C NW Sec. 26-16-5w... Shut down 4,320 ft.
Reiter-Foster Oil Co.'s No. 1 Unknown, SW cor. SE Sec. 23-15-6w ..... Rig.

**LOGAN COUNTY**

Champlin Refining Co.'s No. 1 Clark, SE cor. SW Sec. 8-19-4w ..... Drilling 4,754 ft.; show gas.
Roxana Petroleum Corp.'s No. 1 Freelove, SW cor. SW Sec. 17-19-4w ..... 100 bbls. oil 6,128-6,132 ft.; drilling.
Sinclair Oil & Gas Co.'s No. 1 Webber, SE cor. SE Sec. 18-19-4w ..... Drilling 4,920 ft.
Huckaby & McCoy's No. 1 Perfect, NE cor. NE Sec. 9-18-5w ..... Shut down 3,370 ft.
Haley & Smith's No. 1 Guier, SE cor. SW Sec. 33-18-3w... Drilling 3,692 ft.
Garber & Pulse's No. 1 Widdoes, NE cor. SE NW Sec. 33-18-3w ..... Shut down 1,200 ft.
T. B. Slick's No. 1 Bryan, SW cor. SE Sec. 28-17-1..... Drilling 5,612 ft.
Willis and others' No. 1 Sweezy, SW cor. NW SE Sec. 26-17-3 ..... Shut down 4,677 ft.
W. R. Ramsey's No. 1 McMillan, NW SW Sec. 24-15-3w... Hole full water 4,507-4,517 ft., shut down for orders.
Bu-Vi-Bar's No. 1 Kirkpatrick, NE SW SW Sec. 12-15-1w. Shut down 4,504 ft.

**BLAINE COUNTY**

Lowen and others' No. 1 Unknown, NW cor. SW NW Sec. 27-16-11w ..... Spudded and shut down.

**MUSKOGEE COUNTY**

Finefield and others' No. 1 Jobe, NE cor. NW SE Sec. 12-15-18 ..... Sand 1,100-10 ft., dry, shut down 1,252 ft. in lime at contract depth.
J. R. Parks No. 1 Beuge, CWL NE NW Sec. 13-15-19..... Drilling 270 ft.
J. A. Evans' No. 1 Thompson, SW cor. NW SW Sec. 2-14-19 ..... Shut down 510 ft.
Elk Drilling Co.'s No. 1 Jones, SW cor. SW Sec. 34-13-17 ..... Spudded and shut down.
Sioux Oil Co.'s No. 1 Bradshaw, CEL NW NE Sec. 24-13-18 ..... Drilling 1,000 ft.
L. T. Haney's No. 1 Mitchell, SE cor. NW SE Sec. 33-13-18 ..... Drilling 1,660 ft., show of oil and gas.
Relestone and others' No. 1 Hixon, CNL SE NE Sec. 1-13-19 ..... Drilling 1,350 ft.

**OKLAHOMA COUNTY**

Cromwell Oil & Gas Co.'s No. 1 Proctor, C SE Sec. 21-14-3w ..... Shut down 4,075 ft.
Slick & Bailey's No. 1 Koester, C SE NE Sec. 18-13-3w... Rigging up standard tools and shut down 3,800 ft.
Cromwell & Franklin's No. 1 Thompson, SW cor. NE NE Sec. 15-12-3w ..... Drilling out cement 6,820 ft.
Cromwell & Franklin's No. 1 Gross, SW cor. NE SW Sec. 33-10-2w ..... Shut down 4,702 ft.

**CREEK COUNTY**

Lima Oil & Gas Co.'s No. 1 Grayson, NW cor. NE NE Sec. 11-14-7 ..... Underreaming 3,431 ft.

**CANADIAN COUNTY**

T. B. Slick and others' No. 1 Panowrech, NW SE Sec. 29-13-5w ..... Hole full water 4,328-4,452 ft., shut down 4,580 ft.
Ramsey Brothers' No. 1 Newman, CNL NE Sec. 9-11-7w... Drilling 4,115 ft.

**LINCOLN COUNTY**

Bu-Vi-Bar Petroleum Co.'s No. 1 School Land, C NE SE Sec. 16-13-4 ..... Shut down 4,500 ft.

**OKFUSKEE COUNTY**

Barnsdall Oil Co.'s No. 1 Self, SW cor. SE NE Sec. 21-13-9 ..... Wilcox 3,898-3,905 ft., hole full water, shut down.
Prairie Oil & Gas Co.'s No. 1 Gray, SW cor. SW Sec. 19-11-7 ..... Drilling 4,365 ft.
Moose & Daniels' No. 1 Stidham, SW cor. NW Sec. 4-11-10 ..... Shut down 622 ft.

**SEQUOYAH COUNTY**

Hunt and others' No. 1 Unknown, SE cor. NW SW Sec. 12-12-23 ..... Rigged up and shut down.
Citizens Gas Co., No. 1 Greenstreet, SW cor. NE SE Sec. 33-12-27 ..... Rig.

**POTTAWATOMIE COUNTY**

H. F. Wilcox Oil & Gas Co.'s No. 1 Pickard, SE cor. SW Sec. 32-11-2 ..... Dry and abandoned 4,500 ft.
Shaffer-Kilgore-Sykes' No. 1 Ives, C SE SE Sec. 12-10-3 ..... Shut down 4,744 ft.
Prairie Oil & Gas Co.'s No. 1 Lumbley, SW NW SE Sec. 1-10-5 ..... Casing 4,690, top Viola.
Central Commercial Oil Co.'s No. 1 McCrain, NW cor. NE SW Sec. 16-10-5 ..... Drilling 4,730 ft.
Superior Oil Co.'s No. 1 Herminghausen, SW cor. NW NE Sec. 24-8-2 ..... Drilling 4,124 ft.
Davy & Detrick's No. 1 McGehee, SW SE NW Sec. 10-6-2 ..... Shut down 4,998 ft.

**CADDO COUNTY**

Magnolia Petroleum Co.'s No. 1 Shelby, SW cor. SW Sec. 28-10-12w ..... Drilling 1,760 ft.
J. V. Bailey's No. 1 Hubbard, C NE NW Sec. 1-10-6w.... Shut down 150 ft.
W. J. Hartley's No. 1 Galbreath, SE cor. NW SE Sec. 29-5-12w ..... Shut down 3,394 ft.

**OSAGE COUNTY**

Kay County Gas Co. No. 1, SE cor. SW Sec. 4-25-6..... Shut down 3,349 ft.


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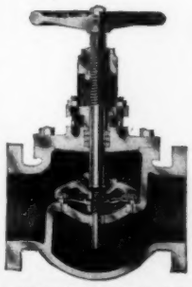

*Sectional view, Fig. 142, Jenkins Standard Iron Body Globe Valve, flanged.*

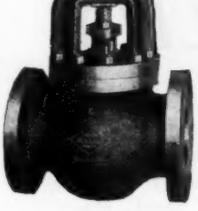

*Fig. 162 Flanged, Jenkins Extra Heavy Iron Body Globe Valve.*

*Fig. 325 Screwed, Jenkins Standard Iron Body Gate Valve.*

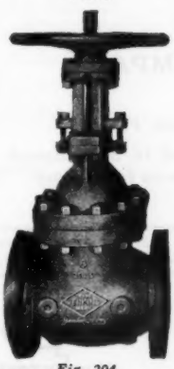

*Fig. 204 Flanged, Jenkins Extra Heavy Iron Body Gate Valve*

Reserve strength is built into a Jenkins Iron Body Valve. Each Valve has an "iron constitution;" each is made for the maximum service, not merely the average.

The Jenkins "Diamond" mark on a valve gives an engineer the same assurance of trouble-free performance as the same mark on a bronze valve. The iron body valves are made fully in accordance with Jenkins standards.

Jenkins standards include metal analyses before and after casting, and the making of an iron body valve is a work of precision and care. Machining is held to close limits, assembly is painstaking, thorough and frequent inspection is given the valves in the various stages of manufacture.

Then the valve is given a final test before it leaves the factory. It must prove that it makes good under pressures higher than those for which it is recommended.

Jenkins Iron Body Valves, like all Jenkins Valves, are obtainable at supply houses everywhere.

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Jenkins Valves
SINCE 1864

KEYSTONE COPPER STEEL

# MALONEYS EXCEL IN *DURABILITY*

MALONEY Bolted Steel Tanks are outstanding for the quality most desired in tanks —the durability that means true economy. This superior endurance is obtained by manufacture from Keystone Copper Steel, the most durable of sheet steel.

Other MALONEY advantages are: Seams made vapor-tight as a result of our patented "crimp" construction, packing with special rubber gasketing and dressing with our Gaso cement; Reinforcement of seams with rigid steel channels; Special bolts of 90,000 pounds tensile strength; Large cleaning out plates set flush with bottoms; Maloney Special Pearl Gray Paint; The best obtainable valve and thief-hatch equipment.

*Illustration shows battery of 5 1,000-Bbl. MALONEYS in Pyrte, Texas, field, southern crude lease.*

*"Alone in Quality"*

**MALONEY TANK MFG. COMPANY**
**Tulsa, Okla., U. S. A.**

***Distributors at All Principal Petroleum Points***

**Sizes: 12 to 10,000 Barrels**

**Packed in Steel-Bound Crates for Export**

***Howell Aluminum "3-in-1" Vacuum Pressure Valve and Thief-Hatch—The BEST and LATEST Deck Equipment—POSITIVE Safety.***

MADE OF KEYSTONE COPPER STEEL

MALONEY PATENTED BOLTED COPPER-STEEL TANKS

MADE OF KEYSTONE COPPER STEEL

MALONEY TANKS

Indian Terr. Ill. Oil Co. No. 1, SE cor. NE Sec. 8-25-7.....Shut down 2,778 ft.
Prairie Oil & Gas Co. No. 1, SE cor. NE Sec. 11-24-6.....Drilling 2,975 ft.
Devonian Oil Co. No. 1, NW cor. SE Sec. 18-22-8.....Drilling 2,100 ft.

**SEMINOLE COUNTY**

Roxana and Barnsdall's No. 1 Stidham, NW cor. NE Sec. 6-10-7.....Location.
Prairie Oil & Gas Co.'s No. 1 Davis, NE SE Sec. 21-10-7..Rig
Prairie Oil & Gas Co.'s No. 1 Varnum, NW cor. SW SW Sec. 5-9-6.....Drilling 3,930 ft.
The Texas Company's No. 1 Reed, SW cor. SW Sec. 12-8-5.....Failing hole 3,963 ft.
Twin State Oil Co.'s No. 1 Walker, NE cor. NE Sec. 5-7-6.....Rig on ground.
Simon & Bean's No. 1 Palmer, SE cor. NW NE Sec. 7-7-6.....Rigged up and shut down
Reiter-Foster Oil Co.'s No. 1 Coat, SW cor. NW SW Sec. 14-7-6.....Location.
Indian Territory Illuminating Oil Co.'s No. 1 Marshall, NW NW SW Sec. 32-7-7.....Fishing 4,759 ft.
Magnolia Petroleum Co.'s No. 1 Vierson, SE SE NW Sec. 6-6-7.....Cleaning out 3,370 ft
The Texas Company's No. 1 Reed, NE cor. NW NE Sec. 24-6-7.....Location.
Gardner Petroleum Co.'s No. 1 Unknown, NW cor. SE Sec. 36-6-7.....Drilling 2,583 ft.

**BECKHAM COUNTY**

C. & H. Petroleum Co.'s No. 1 Barnes, SW cor. NW NE Sec. 32-9-22w.....Shut down 3,800 ft.
Pferffel and others' No. 1-A Carter, NE cor. NE Sec. 35-9-22w.....Shut down 300 ft.

**GRADY COUNTY**

Remington and others' No. 1 Fryrear, SW SW NE Sec. 13-9-5w.....Shut down 720 ft.; may start up soon.
Bedner and others' No. 1 Willis, C SW NW Sec. 13-7-5w.....Shut down 2,450 ft.
Nichlos & Page's No. 1 Drake, SE NE SE Sec. 7-5-7-w....Shut down 1,900 ft.

**M'INTOSH COUNTY**

Marlone Oil Co.'s No. 1 Sanders, NW cor. NE SW Sec. 10-9-18.....Shut down 2,250 ft.

**M'CLAIN COUNTY**

Daniels & LeWright's No. 1 Vandever, C SW Sec. 18-7-1w.....Rig and tools.

**KIOWA COUNTY**

A. C. Varner and others' No. 1 Bonham, CSL NW NW Sec. 5-6-18w.....Shut down 1,127 ft.

**PONTOTOC COUNTY**

Gillespie & Gant's No. 1 Taylor, SW SW SE Sec. 12-5-4...Sand 2,818-52 ft., water; plugged back 2,570 ft, shot 80 and 10 quarts; swabbed 39 bbls.; shut down.
T. B. Slick's No. 1 Barnett, NE SE NW Sec. 13-5-6.....Shut down 3,245 ft.
Sinclair Oil & Gas Co.'s No. 1 McDaniel, NE cor. NE Sec. 17-5-6.....Drilling 3,418 ft.
Mid-Continent Petroleum Corp.'s No. 1 Unknown, SE NE NE Sec. 14-5-7.....Location.
T. B. Whitney and others' No. 1 Moore, SE SW Sec. 17-5-9.....Drilling 900 ft.
Winkler and others' No. 1 Tiner, C SW SE Sec. 21-5-9...Shut down 2,761 ft.
Dixie Oil Co.'s No. 1 Perkins, SE NW Sec. 15-4-1.....Drilling 4,480 ft.
R. F. Garland's No. 1 Strickland, SW NW SW Sec. 10-4-3.....Reaming 2,650 ft.
Marland Oil Co.'s No. 1 Lawrence, C SW SE Sec. 10-4-4..Drilling 1,305 ft.
C. J. Shervin and others' No. 1 Wright, NW NE NE Sec. 13-4-6.....Shut down 1,925 ft.
Boles and others' No. 1 Rayburn, SW SE Sec. 35-4-6....Shut down 1,340 ft.
J. E. Crosbie's No. 1 Nowabbi, SE NE SW Sec. 8-4-7.....Rigging up rotary.
Henry and others' No. 1 Gregg, SW SE NW Sec. 14-4-7...Shut down 1,090 ft.
Jolly-Ogg Oil Co.'s No. 1 Neeley, SE NE Sec. 24-3-10w...Drilling 996 ft.

**GARVIN COUNTY**

Magnolia Petroleum Co.'s No. 1 Vaughn, NW SW NW Sec. 12-3-1.....Drilling 4,650 ft.
Heath & Bauman's No. 1 Hatrell, SW SE SW Sec. 10-3-3.....Shut down 1,640 ft.

**COMANCHE COUNTY**

Daneiger & Ellis' No. 1 Spitler, NE cor. SE Sec. 10-2-10w..Abandoned 2,203 ft.
Ashcraft and others' No. 1 School Land, SE cor. SE Sec. 20-2-10w.....Broken sandy lime 822-964 ft.; swabbed 8 bbls.; total depth 976 ft.; shut down; material moved out.
Jenkins and others' No. 1 Smith, SW cor. SE SE Sec. 34-1-10w.....Shut down 1,530 ft.

**COAL COUNTY**

Green and others' No. 1 Wilson, C NE SW Sec. 14-1-12w...Shut down 2,210 ft.; show gas
Revels & Magee's No. 1 Labor, NW cor. NW Sec. 17-1-2...Shut down 240 ft.
McGraw and others' No. 1 Patton, SW SE NE Sec. 35-1-8.....Shut down 973 ft.
Indian Territory Illuminating Oil Co.'s No. 1 Harris, SW cor. NW Sec. 10-1-11.....Fishing 1,630 ft.

**OKLAHOMA PANHANDLE**
**CIMARRON COUNTY**

Phillips and others' No. 1 Unknown, NW cor. NW Sec. 24-6-2.....Drilling 4,215 ft.
Sinclair Oil & Gas Co.'s No. 1 School Land, NW cor. NW Sec. 22-5-2.....Building rotary rig; old total depth, 3,595 ft. Core 4,624 ft.
Ramsey Brothers' No. 1 School Land, NE SW SW Sec. 21-5-5.....Drilling 100 ft.
Ramsey Brothers' No. 1 Unknown, NW NE Sec. 27-5-5....Fishing tools, total depth 4,681 ft
Ramsey Brothers' No. 1 School Land, SE SE Sec. 34-4-1..Drilling 3,110 ft.
Gladys-Belle Oil Co.'s No. 1 Isserial, SW NE Sec. 25-3-7 Drilling 4,298 ft.
Valerius & Wilkinson's No. 1 Unknown, SE cor. NE Sec. 25-3-7.....Drilling 2,875 ft.
H. F. Wilcox Oil & Gas Co.'s No. 1 Zea, NE SW Sec. 28-3-13.....Shut down 2,765 ft.
Skaer and others' No. 1 Mathis, SW NE NE Sec. 17-3-23..Drilling 3,170 ft.
Ross Fenton and others' No. 1 Graves, NE NE Sec. 2-2-9..Spudded and shut down

**TEXAS COUNTY**

Danner Oil Co.'s No. 1 Graves, NE cor. SW SW Sec. 23-2-18.....Shut down 700 ft.
Newsom and others' No. 1 Allison, SE SE Sec. 4-1-12....Shut down 4,040 ft.
Dotton and others' No. 1 Baker, C NW Sec. 4-1-13.....Hole full of water 3,218-58 ft.; drilling.
H. & H. Oil Co.'s No. 1 Hitch, NE cor. NE, Sec. 26-1-15...Shut down 600 ft.
Three Way Oil Co.'s No. 1 Cane, SW NW Sec. 11-1-13...Hole full of water 3,218-58 ft.; drilling.
Conley and others' No. 1 Unknown, SE cor. NW Sec. 5-1-19.....Spudded and shut down

**SOUTHERN OKLAHOMA**
**BRYAN COUNTY**

Green Oil & Ref. Co.'s No. 1 Kemp, SE cor. NW NW Sec. 28-8s-9.....Shut down 600 ft.
Alexander & Oppenheimer's No. 1 Hampton, SE cor. NE Sec. 26-7s-11.....Shut down 1,425 ft.

**JEFFERSON COUNTY**

J. R. McCoy and others' No. 1 Smith, SE cor. NW Sec. 14-7s-6w.....Rigged up and shut down

**CHOCTAW COUNTY**

Hugo Gay's No. 1 Smith, SE cor. SW NW Sec. 27-6s-16...Shut down 1,540 ft.
Choctaw Petroleum Co.'s No. 1 Wilson, SW cor. SW Sec. 15-6-19.....Shut down 1,346 ft

**TILLMAN COUNTY**

A. N. Peterson's No. 1 Mounts, SW cor. SW Sec. 3-5s-15w. Rig.
Fred Chopman's No. 1 Neif, NE cor. NW NE Sec. 11-5s-4.....Shut down 380 ft.
Landfair and others' No. 1 Smith, SE SW SE Sec. 6-2s-16w.....Shut down 2,280 ft.

**MARSHALL COUNTY**

Kennedy Drilling Co.'s No. 1 Sacra, SW NE SW Sec. 17-5s-5.....Shut down 1,810 ft.
Laurel Oil & Gas Co.'s No. 1 Chastine, SE NW Sec. 26-4s-5.....Drilled to 2,055 ft. and abandoned; rigging rotary to drill deeper.

**STEPHENS COUNTY**

Pierce & Brown's No. 1 Garland, SE NW NE Sec. 34-2s-6w.....Shut down 1,700 ft.

**JOHNSTON COUNTY**

McPherson and others' No. 1 Wyand, CSL NE NW Sec. 7-2s-9.....Shut down 4,400 ft.
Wapanucka Oil Co.'s No. 1 Banks, Sec. 28-2s-9.....Show of oil 2,131 ft.; shut down

**CARTER COUNTY**

Grooms and others' No. 1 Morris, CSL NW NE Sec. 19-1s-2w.....Shut down 3,463 ft.

**MURRAY COUNTY**

Thompson Oil Co.'s No. 1 Freeman, SE cor. Sec. 27-1s-3...Rig.

# *Yes Luck—*

## *without Asco Steel his well might have been abandoned*

Luck is a factor—but the most important above all is good tools. The fellow who gets the oil is the operator who has proven that the way to prevent costly fishing jobs and production delays is to standardize on tools made of ASCO STEELS.

The years ASCO STEELS have served the industry, in fields throughout the world have resulted in increased sales, earned by long life and dependable operation. Use them on your next job and prove the dollars and cents value of quick, uninterrupted production.

"A Story of Steel and Oil" is a historical sketch of the petroleum industry. Write for your copy today.

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541 McCormick Bldg., Chicago, Ill.

# KENNEDY
## VALVES *and* FITTINGS
## *for oil service*

Fig. 781 2500-lb. Test | Fig. 191 1600-lb. Test | Fig. 187 700-lb. Test | Fig. 57 300-lb. Test | Fig. 58 300-lb. Test | Fig. 188 700-lb. Test | Fig. 192 1600-lb. Test | Fig. 791 2500-lb. Test

*STEEL GATE VALVES*

*IRON BODY GATE VALVES*

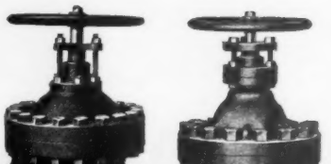

Fig. 908 | Fig. 910

Fig. 601 | Fig. 611

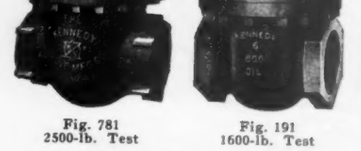

Fig. 921 | Fig. 923

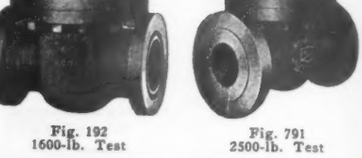

Fig. 761 | Fig. 76

*MALLEABLE IRON FITTINGS*

*MALLEABLE IRON FITTINGS*

Fig. 301 | Fig. 312 | Fig. 319

Fig. 324 | Fig. 321 | Fig. 322

Fig. 27 | Fig. 150 | Fig. 103

Fig. 492 | Fig. 40 | Fig. 544

*Standard Bronze Valves*

*Extra-Heavy Bronze Valves*

THE valves and fittings shown here represent but a small part of the Kennedy line of thousands of different types and sizes, including globe and angle valves up to 750-lb. working oil pressure, gate valves up to 2500-lb. test pressure, standard malleable iron fittings, bronze fittings and cast iron flanged fittings and flanges.

A half-century of experience is behind each Kennedy design, and is your safeguard against service troubles and maintenance expense. Ample stocks are maintained by wholesalers for immediate delivery and the manufacturing facilities of two large plants assure prompt shipment of orders for unusual requirements.

*Write for the Kennedy Catalog.*

**THE KENNEDY VALVE MFG. CO.**

Elmira, N. Y.

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# Roxana Will Fill Big Concrete Tanks With Winkler Oil

SAN ANGELO, Tex., Feb. 23.—Erection by Roxana Petroleum Corp. of mammoth underground concrete storage tanks at Monahans and McCamey, each to hold 1,000,000 bbls., primarily are with a view to handling Winkler County production and in no wise will disturb the present pipe line proration in Pecos County. Roxana so advised the San Angelo Standard in a telegram from St. Louis in response to its inquiry if two 1,000,000-barrel reservoirs, instead of one, were to be constructed at McCamey, and, if so, what would be the effect, if any, on the situation in Pecos County.

"We are emphatically opposed to breaking the proration agreement in Pecos County and are now doing and will continue to do everything in our power to maintain the present reasonable basis of development," said the telegram. It added that only two 1,000,000-bbl. tanks will be built at this time; one at Monahans and one at McCamey.

Flood lights illumine the 13 acres near Monahans, in Ward County, in order that work may proceed at night upon Roxana's big reservoir there. Ground has not yet been broken for the big tank east of McCamey. Roxana has in operation separate pipe lines from McCamey to the Yates Pool and to the Hendricks Pool in Winkler County and is now building a trunk line from Oklahoma to McCamey to carry to its refineries the oil that will be stored in the new giant tanks.

## HUMBLE COMPANY WINS RIGHT TO LAY LINE

FORT WORTH, Tex., Feb. 25.—Humble Pipe Line Co. won its suit in the Court of Civic Appeals at Austin, Tex., to build a line over the shallow waters of the gulf from Ingleside Harbor, terminal for the 50,000-bbl. capacity line running south from Kemper Station, to deep water, so large tankers could be loaded. A temporary injunction granted two weeks ago by the Fifty-third District Court was reversed and dissolved.

Attorney General Pollard obtained the temporary injunction on the ground that the bay was under the jurisdiction of the State Game Commission and that the company had no permit and that a special act of the Legislature would be necessary.

The court, in an opinion by Judge M. B. Blair, held that the statutes making the pipe line companies common carriers conferred upon them powers of eminent domain, that no special act of the Legislature is needed and that the pipe line fulfills a public need and serves commerce as much as a railroad or other utility.

C. W. Trueheart, assistant attorney general, indicated that a motion for rehearing is probable and that if denied an appeal will be taken to the Supreme Court. Meanwhile there is a question whether the company has authority to go ahead.

"The trial court held that the statutes do not authorize the company to lay its pipe lines across and under beds and bottoms of bays belonging to this State or that part of the gulf within the jurisdiction of the State," the opinion reads, "the appellant company therefore was a trespasser upon tidal lands and waters. In 1919 the Legislature declared pipe line companies common carriers and conferred the right of eminent domain upon them, and in the same year other regulatory statutes concerning them were enacted.

"But the appellant does not depend upon any express statutory authority but upon a reasonable necessary implication of the right to use these bays as necessary to the power expressly granted for the execution of its purposes.

"We have reached the conclusion that the appellant's contention is correct. A public grant for public service must be construed liberally, so as to effectuate the purposes of the grant. Such decisions already were made long prior to establishment of pipe lines in analagous cases.

"It must necessarily follow that the appellant corporation has the right to construct and lay its pipe line to any port, dock or deep sea loading point which the good business enterprise and judgment of those engaged in pipe line and shipping industries deem necessary for the petroleum industry.

"The contention that a specific act of the Legislature is necessary is wholly without merit or reason."

Humble company recently started a survey to its Webster tank farm near Houston. In the event construction of the line to a deep water loading dock was seriously delayed or prohibited, a line east to Houston would have probably been built.

Illinois Pipe Line Co. has almost completed its line from Del Rio in Val Verde County to connect with the Humble company's line at Lytle station. The line will be 137 miles in length.

## TEXAS PANHANDLE

(Continued from Page 46)

feet in lime the well swabbed 10 bbls. per day.

**Sherman County**

Phillips Petroleum Co. and Prairie Oil & Gas Co.'s No. 1 Price & Fuqua, C NE, Section 33, Block 2-B, G.H.&H. Survey, made 2,000,000 feet of gas from lime at 3,325-3,420 feet. The hole filled up with water at 3,680 feet and was abandoned at 4,001 feet.

**Wheeler County**

Mid-Kansas Oil & Gas Co.'s No. 1 J. F. Contes, Section 93, Block 17, H.&G.N. Survey, made 17,000,000 feet of gas with 305 pounds rock pressure from lime at 1,940-50 feet. Woodtes Oil Co.'s No. 2 C. A. Linkey made 58,000,000 feet of gas with 425 pounds rock pressure, in an 8-inch hole, at 1,850-2,180 feet.

### RANGER DISTRICT COMPLETIONS

**Week Ending February 25**

**Brown County**

Atlantic Oil Producing Co.'s No. 1 Tullos, was drilled to a total depth of 1,323 feet and had an initial production of 63 bbls. from pay at 1,297-1,314 feet. Blanchard and others' No. 2 Kesley was dry and abandoned at 1,350 feet. Cranfill & Reynolds' No. 1 Hill flowed 43 bbls. in 12 hours from pay at 1,300-06 feet. Same company's No. 2 Newton was drilled to a total depth of 1,153 feet and made 60 bbls. initially from pay at 1,128-42 feet. Gibson & Johnson's No. 1 George was dry and abandoned at 1,604½ feet. Humble Oil & Refining Co.'s No. 4-A Allen had a show of oil at 1,096-1,121 feet; a 5-quart shot was set off at 1,109-19 feet and the well increased to 15 bbls. Logan & Carter's No. 1 Mansfield was dry and abandoned at 1,407 feet. Mitchell's No. 2 Allcorn was dry and abandoned at 1,157 feet. Pandem Oil Corp.'s No. 4-B Curry had a show of oil at 1,100-12 feet and was drilled to a total depth of 1,113 feet and the well had an initial production of 40 bbls. Scrivenor and others' No. 1 Turner was dry and abandoned at 1,275 feet. Randell and others' No. 1 McDaniel was also dry and abandoned at 915 feet.

**Callahan County**

Brown & Co.'s No. 3 Edwards was dry and abandoned at 1,665 feet. English Oil Co.'s No. 1 Mayfield was a location and has been abandoned.

**Coleman County**

Anzac Oil Co.'s No. 1 Gardner found the gas sand at 2,296-2,302 feet and the oil sand at 2,302-06 feet where the well made 170 bbls. It is now flowing 154 bbls. Cunningham and others' No. 2 Jennings was dry and abandoned at 1,200 feet. Manhattan Oil Co.'s No. 1 Overall found the sandy lime at 2,282-90 feet and was drilled to a total depth of 2,500 feet and the well had an initial production of 30 bbls.

**Eastland County**

Goodwin and others' No. 1 Parker made 18,000,000 feet of gas at 3,013-30 feet.

**Palo Pinto County**

Dixie Drilling Co.'s No. 1 Lane has been temporarily abandoned at 2,250 feet.

**Shackelford County**

Albany Oil Co.'s No. 7 Reynolds was dry and abandoned at 1,334 feet. McGee's No. 1 Elliott was dry and abandoned at 1,000 feet. Roeser & Pendleton's No. 1-A-62 Cook had an initial production of 535 bbls. at 1,336-50 feet.

### WICHITA FALLS DISTRICT COMPLETIONS

**Week Ending Feburary 25**

**Archer County**

Fain-McGaha Oil Corp.'s No. 1 Wilson-A found the pay at 1,560-65 feet with an initial production of 120 bbls. Holcombe and Jones' No. 3 Hawley & Childs was dry and abandoned at 780 feet. D. O. Johnson and others' No. 1 Wilson-A topped the pay at 1,558-63 feet and had an initial production of 115 bbls. Atlantic Oil Producing Co. and Rose's No. 1 Benson, after a 10-quart shot at 847-57 feet, made 2 bbls. initially. Burleson & Chenault's No. 1 Parkey was dry and abandoned at 1,605 feet. Consolidated Oil Co.'s No. 1 Kinder was dry and abandoned at 1,350 feet. Panhandle & Grisham's well was dry and abandoned at 1,570 feet.

**Cooke County**

W. J. Green and others' No. 3 Campbell was dry and abandoned at 788 feet. Heydrick-Camp Drilling Co.'s No. 1 Lynch, Stahl and others made an 8-bbl. well at 1,361-80 feet.

**Montague County**

Arco Oil Co.'s No. 3 Loy and others found the pay at 804-19 feet and had an initial production of 31 bbls. of oil and a half barrel of salt water. Bridwell & Heydrick's No. 4 Salmon-A topped the pay at 1,155 feet and bottomed at 1,177 feet with an initial production of 55 bbls. Pure Oil Co.'s No. 4 Loy and others made 25 bbls. from pay found at 796-818 feet. The Texas Company's No. 3 Hinton had an initial production of 10 bbls. from pay found at 781-95 feet. Dickey and others' No. 1 Hinton has been temporarily abandoned at 2,277 feet.

**Wichita County**

Ascot Co.'s No. 2 Roller-A was dry and abandoned at 408 feet. Lomas and others' No. 1 W. H. Chilsen was dry and abandoned at 1,289 feet. Panhandle Refining Co.'s No. 2 Warren was dry and abandoned at 1,650 feet. Same company's No. 3 Warren was dry and abandoned at 1,656 feet. E. J. Slump & Co.'s No. 1 Chilsen-A was dry and abandoned at 1,851 feet. G. S. Dudley's No. 4 Kemp & Kempner found the pay at 1,630-31 feet and has an estimated production of 10 bbls. L. P. Hammond's No. Waggoner Brothers was dry and abandoned at 1,952 feet. C. H. Lebow's No. 12 A. J. Schultz was junked and abandoned at 1,672 feet. Perkins & Cullum's No. 9 Beaver-Electra was dry and abandoned at 1,650 feet. Shappell Oil Co.'s No. 13 Kemp & Kempner-A found the pay at 1,620-30 feet and had an initial production of 20 bbls. The Texas Company's No. 346 W. T. Waggoner was dry and abandoned at 1,055 feet. Wolfe & Garyce Oil Co.'s No. 4 E. Daume was dry and abandoned at 1,873 feet.

**Wilbarger County**

Roxana Petroleum Corp.'s No. 1 Milner found the pay at 1,680-85 feet and made 26 bbls. the first 24 hours after heading.

**Young County**

Alexander and others' No. 2 Johnson was dry and abandoned at 612 feet. Kleiner and others' No. 2 Langston found the pay at 566-83 feet and made 38 bbls. initially. Roberts Oil Corp.'s No. 1 Thomas was dry and abandoned at 1,052 feet. This well had a 4-bbl. show. Seigler's No. 1 Bloodworth was dry and abandoned at 908 feet.

## 1928 REFINERY SURVEY, SHUT-DOWN PLANTS BY STATES

(Continued from Page 134)

| | | | |
|---|---|---|---|
| **WASHINGTON** | | | |
| Spokane Oil & Refining Co., Hillyard | 1,000 | S | |
| Inland Empire Refining Co., Parkwater | 500 | S | |
| Total | 1,500 | | |
| **WYOMING** | | | |
| Alliance Oil & Refining Co., Thermopolis | 1,500 | S | |
| Clay Spur Refining Co., Clay Spur | 200 | S | |
| Lovell Refinery, Lovell | 600 | S | |
| Egaso Holding Corp., Osage | 1,000 | S | Cross |
| Total | 3,300 | | |

## DRILLING IN COLOMBIA HINDERED BY DECREE

NEW YORK, Feb. 18.—Following receipt here of official copies of a new oil decree issued by the Ministry of Industries of Colombia under date of January 30, representatives of American companies operating in Colombia admitted they could not continue wildcatting operations unless it is modified.

The decree prohibits oil operators from drilling or continuing to drill wells within the republic unless they have obtained a permit from the Minister of Industries granted on petition made in accordance with conditions specified in the decree. Severe penalties are provided for persons failing to comply with those provisions.

One of the most important conditions under which permits are to be granted is that all petitions referring to private lands must be accompanied by titles proving ownership of the property in question. Authority is given to the Minister of Industries to examine and decide whether titles are valid and the petitioner has proved his ownership of the oil lands.

## ROSES WILL BEAUTIFY WEST TEXAS OIL CAMPS

SAN ANGELO, Tex., Feb. 25.—John Meisenbacker, landscape gardner and formerly superintendent of parks in Tulsa for 18 years, is bringing beauty to the oil camps of West Texas by the practice of his art. He is planting about 900 rose bushes at the camp of the Reagan County Purchasing Co. in Reagan County, in an effort to make living in the field just a bit more pleasant. He predicts that at a not far distant date the practice of skilled gardening at all company camps will come into use.

"Wes Texas soils with a little treatment will yield flowers abundantly and with rich colorings," he said.

Company houses in the West Texas area are substantially and comfortably built with many of them equipped with modern conveniences. This attempt at beautification is in an effort to make living conditions even more comfortable and attractive for the workers. There has been a heavy labor turnover in the fields.

### BLACKWELL IN TEXAS

The Blackwell Oil & Gas Co. has taken over the holdings of the Cushing Refining & Gasoline Co. in Texas, which operated producing property in Crockett County which was bought from P. H. Williams last summer. The Cushing office in San Angelo is to be taken over by the purchasing company, though it is to remain in charge of Charles Ellison. The new company plans a drilling campaign in West Texas when oil conditions become better.

### LINE ACROSS BRAZOS BRIDGE

The Humble Pipe Line Co.'s application to the Commissioners' Court of Austin County, Texas, asking for permission to construct a pipe line across the Brazos bridge between Bellville and Hempstead, has been granted.

## REAL TESTING FIELD FOR DEEP DRILLING

(Continued from Page 86)

derreaming is also necessary if 10¾-inch casing is to be run through 13⅜-inch casing. The underreamer enlarges the drilled hole about 1 inch in diameter. The underreaming is usually done about every 300 to 500 feet while the hole is being drilled.

The 12¾ or 10⅝-inch hole is drilled to within 50 feet of the correlative top of the oil zone and then the hole is cored continuously. When the extreme depth of the top of the oil sand is considered, it is necessary to start coring high to offset the possibilities of crooked holes. Also the shale body above the oil zone is very thin and it is necessary to penetrate the oil sands 30 or 40 feet until sufficient shale strata are found to insure a permanent water shutoff. The shale strata are not continuous but are lenticular. Knowing this to be the case, it is desirable to have exact knowledge of the thickness of the shale strata before running the secondary water string. Due to the heavy gas pressure within the oil zone, it is necessary to have several shale strata behind the water string so that all or any of these strata will form a bond with the cement to exclude all top water.

Having drilled and underreamed the hole to the depth where the secondary water string is to be cemented, the hole is conditioned for running casing. The same equipment and method is used in running this casing as was used with the primary water string.

The 8⅝ or 9-inch casing has a casing turner placed in the string so that when the casing is landed it will be above the highest point to which the cement can possibly reach. Also, the casing turner must be up inside the primary water string where it will not "freeze" or become sanded up. The casing turner does not prevent wear on the casing but does prevent uneven wear. The casing is usually worn out where the hole is crooked and the wear of the drill pipe is concentrated on one side. By the use of a casing turner the secondary water string can be rotated above the turner, thus distributing the wear evenly on all sides.

After finding bottom by circulating down the last joint, the casing is cemented, using 350 to 600 sacks of oil-well cement, and treating the last 200 sacks with a quick hardening chemical. The cementing operations are the same as used when cementing the primary water string.

The casing is allowed to stand three to seven days and is then "landed" in the same manner as the primary water string. The conductor pipe is again reduced to the same size as the secondary water string. The conductor pipe is built the same as before except that some operators use a master gate. The outside flow assembly is used as before. In case the master gate is not used, a flow assembly is made up and stood back in the rig for instant use. The flow assembly has a swedge flange on bottom that bolts to the blowout preventer.

### Casing Test

The hole is then bailed to 1,500 feet and the casing is tested. The cement is drilled out of the casing with a 4-inch drill pipe and 5 feet of hole is made ahead of the casing shoe. The hole is then bailed to 1,500 feet to test the shutoff. Some operators run tubing to about 1,000 feet from bottom and the fluid is swabbed down to 1,500 feet. Extreme care is taken in establishing whether or not the water is permanently excluded. A rise in fluid level and the comparison of salt content from top and bottom fluid samples usually indicate whether or not the shutoff is effective. In case there is any doubt, about 20 feet of hole is drilled, tubing run, and a production test made.

After having obtained an effective shutoff, drilling is continued. A rotating blowout preventer is now used. Essentially this blowout preventer is the same as used before with the exception of a longer body, rotating packing assembly and a bolt flange on top which allows the flow assembly to be bolted to it in case the well comes in through the drill pipe. This type of blowout preventer, allows the drill pipe to be rotated freely, and moved up and down at the same time. This reduces the danger of the drill pipe becoming stuck while the well is "blowing."

A 9¾, 7⅞ or 7⅝-inch hole is made depending on whether 10¾, 9 or 8⅝-inch casing was used for the secondary water string. This hole is made with fishtail bits or hard rock bits on 4-inch drill pipe. Most of this hole is made with hard rock bits, as these bits wear longer and therefore do not necessitate the running in and out of the hole with the drill pipe to change bits so frequently while drilling into the high-pressure oil sands.

The 4-inch drill pipe is equipped with antifriction tool joints, subs or collars while drilling through the secondary water string. Besides causing less wear on the casing these antifriction devices allow the drill pipe to be rotated with considerably less power. This is because there is less friction between drill pipe and casing. The strain on the drill pipe is reduced, and consequently lessens twistoffs. The antifriction tool joints, subs or collars are only used on the drill pipe that is inside the casing. By using antifriction devices on the drill pipe, secondary water strings have been drilled through for as long as 90 days without showing any noticeable wear. By the use of ordinary tool joints and collars the casing is often worn through in 30 days.

### After Testing Shutoff

On wells that are being drilled on top of the structure, where the distance between the primary and secondary water shutoff is less than 1,000 feet considerable hole is sometimes drilled ahead of where the secondary water string is to be cemented. After continuing into the oil zone as far as deemed safe, a cement plug is placed in the hole just below the depth at which the water string is to be cemented. The casing is then landed on this plug and cemented. After testing the shutoff, the cement plug is drilled and the hole cleaned out to bottom. This eliminates considerable wear on the secondary water string which is the important water string. This method is dangerous to use in fields where the formation drills easier than set cement, as the bit might sidetrack the cement plug and not follow the hole that has already been drilled. However, due to the hard formations in the oil zone in the Ventura Avenue Field, this method has been very successful.

The rotary hole is continued until the gas pressure becomes so great that further drilling becomes practically impossible. During the drilling of this hole, it is often necessary to use some heavy mineral (such as hematite or barite) to give added weight to the mud fluid to hold down the gas. By the addition of heavy minerals and without increasing the viscosity, the mud fluid can be increased in weight to as much as 105 pounds per cubic foot. Also, it is not good practice to drill through the secondary water string for more than 90 days. The maximum amount of oil zone below the secondary water string that has been penetrated in the Ventura Avenue Field is about 2,600 feet. Wells drilled outside the proved area are often completed with 300 feet to 1,000 feet of oil zone.

After drilling and reaming the hole to the finishing depth, the mud is conditioned for running the oil string. The wells that have shown considerable gas during the drilling into the oil zone are loaded down with heavy mineral mud. The amount of heavy mineral that is to be added to the mud depends on the individual well, some wells being filled to the surface with this type of mud fluid.

### Running Oil String

The oil string is run in the same manner as the water strings except that circulating is unnecessary. The blowout preventer may be left on during the running of the oil string and taken off just prior to landing the casing. The blowout preventer is sometimes removed before running the oil string in which case a nipple, with a landing flange on top, is bolted to the landing flange of the water string. This nipple is the same size as the secondary water string.

The oil string has a steel shoe and a solid steel guide on bottom and a sufficient amount of perforated casing to leave the top of the perforations about 15 feet below the shoe of the last string of casing. The oil string is usually hung 10 to 15 feet off bottom. In case the water string has been drilled through a long time, the oil string is cemented through perforations. If this is done, it becomes necessary to equip the oil string with a special type of baffle plate (cement retainer) for cementing. This baffle plate is placed just above the top of the oil perforations and just below the cement perforations and so that it will be a short distance below the shoe of the water string when the oil string is landed.

Just prior to landing the oil string, a top flange is screwed to the casing. In case the oil string has been run through a blowout preventer, it must be removed before attaching the top flange to the casing. The oil string is then lowered until the top flange rests on the upper landing flange of the water string. These two flanges are then bolted together.

Having successfully landed the oil string and in case the well is to be cemented through perforations, the circulating head is placed on the casing and circulation established. The well is then cemented in the usual fashion except that only 25 to 50 sacks of oil well cement are used. The mud discharge is through the two vents that are provided for in the landing flange.

If the well has been cemented through perforations, the conductor pipe and blowout preventer are screwed to the top flange while drilling out the cement and cleaning out to bottom.

A riser nipple is then screwed to the top flange and the body of the tubing head attached. This nipple should be of suitable length so the tubing head will clear the derrick floor. The tubing head consists of a body and top flange. The body is the same size as the oil string and is provided with slips for running tubing.

Two and a half or three-inch upset tubing is then run through this head to about 100 feet above the top of the perforations. Recently some tubing strings have been run below the top of the perforations to see what effect this procedure will have on the prevailing gas-oil ratio.

After running the tubing the top flange of the tubing head is screwed to the tubing. The slips are then removed from the head and the flange let down upon the body and bolted together. A high-pressure gate valve is screwed to the upper end of the top flange and the flow assembly is then screwed to this high-pressure gate valve.

The flow assembly consists of high-pressure fittings. Also the flow assembly is bolted down by anchor bolts to the bottom flange of the surface casing.

After making all necessary preparations to handle the well, the well is circulated with clear water. The circulation may be established by pumping water down the tubing and allowing it to be discharged through the openings in the tubing head or by pumping in through the openings in the tubing head and allowing the mud fluid to be discharged through the tubing. Unless the well starts flowing during the washing process, the mud is entirely displaced to the bottom of tubing with clear water and the well is then swabbed until it starts flowing.

Wells outside the proved area are often brought in without running an oil string. Due to the hard formations of the oil zone, the walls of the open hole do not cave. This method is used so that in case the well develops water trouble, due to edge conditions, it may be remedied much easier if the oil string has been left out of the hole. Wells with over 1,000 feet of open hole have been brought in and have flowed over two years without sanding up. In case the well is brought in "barefoot" the tubing is hung from 200 to 500 feet above the shoe of the water string and the well connected up and brought in as above.

### Conclusion

An attempt has been made in this paper to describe the equipment and methods used in the Ventura Avenue Field in the drilling of deep wells. This field has been more or less the testing field for oil field equipment in California. The severe tests to which this field subjects the equipment serves as a standard, and any equipment that satisfactorily performs its duty at Ventura can be depended on to do likewise in any other field.

The writers believe that the equipment and methods used in this field can be successfully used wherever deep wells are to be drilled under such hazards as are found in the Ventura Avenue Field.

## CALIFORNIA MARKET NOT IN GOOD SHAPE

LOS ANGELES, Calif., Feb. 25.—California gasoline moving in tankers is showing some improvement. Prices have strengthened somewhat and quotations are generally from 6¼ to 6½ cents at present for U. S. Motor. Special cuts for export in cases are commanding better prices, ranging in the most part from 7½ to 8½ cents per gallon. The demand for these special grades from China, the Philippines and Australasia is holding up very well, with the result that large volumes are moving in this trade.

The domestic gasoline market is soft. On the whole, there has been no material change for two weeks. There are isolated cases where service stations are offering gasoline at as low as 15 cents, tax paid, but these are offset by the fact that more and more independent dealers are displaying 18½-cent signs for their cut-rate gasoline.

Some marketers believe that all so-called bootleg gasoline does not come from the small refiners but that at least one of the larger companies is unloading some of its surplus stock through these channels. While the market is not in very good shape at present, it is believed that unless it becomes worse, there is a good chance that prices will remain at present levels at least for two or three weeks.

Fuel oil continues weak. Prices are giving way slowly and a few sales have been made recently as low as 60 cents. There is no relief from the present depressed condition of the fuel oil market in sight. The renewing of large fuel oil contracts in New York for the coming three years at $1.40 maximum indicates that fuel oil will in all probability continue for some time to come.

## OIL SCOUTS TO MEET AT AMARILLO IN MAY

Amarillo was selected as the 1928 meeting place for the fifth annual convention of the National Oil Scouts' Association of America at a meeting of the executive committee. The dates for the two-day session were fixed on May 21 and 22.

W. N. O'Roark of Shreveport, president of the national association; Ford Turner of San Antonio, chairman of the executive committee, and other members of the committee are in charge of arrangements for the convention. Last year the meeting was held in Dallas. Previous to that the meetings were held at Mineral Wells, Fort Worth and San Antonio.

## PETITION INVALID

OKLAHOMA CITY, Okla., Feb. 25.—Graves Leeper, Secretary of State of Oklahoma, after hearing evidence for more than two months on the 51,000 names submitted by Campbell Russell in support of his oil tax petition No. 101, has held that the petition does not contain 30,985 valid signatures required by law and that consequently the petition is void and the proposed oil tax bill not entitled to a place on the ballot.

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*A vast amount of information has been collected and classified by our bureau of research. These bulletins will gladly be sent on application to the Research Department, Association of Natural Gasoline Manufacturers, 305 Tulsa Building, Tulsa, Oklahoma.*

RESEARCH DEPARTMENT OF THE

ASSOCIATION OF NATURAL GASOLINE MANUFACTURERS

# WILDCAT OPERATIONS IN WEST TEXAS

(Continued from Page 47)

Sartain Oil Co.'s No. 1 Evridge ..... Spudded and shut down.

**CRANE COUNTY**

Crane Dev. Co.'s No. 1 J. R. Mosley, S cor. Sec. 18, Blk. 6, H. & T. C. Sur. ..... Top salt 819 ft.; drlg. 2,675 ft.

Gulf Prod. Co.'s No. 3 W. N. Waddell, SE cor. NE Sec. 3, Blk. B-25, Public School Land ..... Top lime 3,050 ft.; show oil 3,245-49 ft.; drlg. gray lime 3,402 ft.

J. K. Hughes Dev. Co.'s No. 1 State Bank Commission, CSL Sec. 18, Blk. 4, H. & T. C. Sur. ..... Location.

**CROCKETT COUNTY**

V. T. Bolin & Co.'s No. 1 P. C. Coates, NW cor. SW Sec. 4, Blk. 2, I. & G. N. Sur. ..... Shut down 2,110 ft.

Dixie Oil Co.'s No. 1 George Thompson, Sec. 72, Blk. 1.... Location.

J. S. Cosden, Inc., No. 1 Paul Perner, SW cor. Sec. 36, Blk. 2, I. & G. N. Sur. ..... Underreaming pipe 805 ft.

Henshaw and McMan Oil & Gas Co.'s No. 1 W. Owens, C NW Sec. 17, Blk. G.G., G.C.&S.F.R.R. Sur. ..... Location.

Humble O. & R. Co.'s No. 2 P. J. Sorg Est. ..... Drlg. 2,430 ft.

James Kelly et al's (was Corbett & Gill's) No. 1 Todd, C NE Sec. 43, Blk. WX, G. C. & S. F. Sur. ..... Top salt 993 ft.; show oil 1,948 ft.; 700 ft. sulphur water in hole 2,450 ft.; total depth 2,605 ft.; plugged back to 1,948 ft. and shot 120 qts. 1,909-45 ft.; hole filled 250 ft. with water with slight scum of oil.

Van McPhail's No. 1 George Thompson ..... Location.

Van Phail et al's No. 1 George Thompson ..... Location.

Osage Oil Corp.'s No. 2 Halff, 1,200 ft. down river from No. 1 in Sec. 70, Blk. 1, I. & G. N. Sur. ..... Total depth 1,040 ft.; shut down.

Osage Oil Co.'s No. 3 H. M. Halff, Sec. 70, Blk. 1, I. & G. N. R. R. Sur. ..... Skinding rig 18 ft. south.

W. W. Donnelly & Young's No. 1 Massey, Sec. 29, Blk. U-V ..... Shut down 520 ft.

World Oil Co.'s No. 1 Schneeman-B, Sec. 50, Blk. BB, G. C. & S. F. Sur. ..... Top salt 1,070 ft.; hole full salt water 2,210-15 ft.; set 6-in. 2,540 ft.; drlg. 2,830 ft.; hole full sulphur water; shut down 2,880 ft.

M. B. Wyrick et al's No. 1 H. M. Halff, Sec. 68, Block 1, H.&G.N. ..... Underreaming 330 ft.

Young & Donelly's No. 1 J. M. Shannon, C Sec. 11, Blk. 9, D. & S. E. Sur. ..... 7,000,000 ft. gas at 1,662 ft.; shut down 1,676 ft.

Young & Donnelly's No. 2 J. M. Shannon, Sec. 18, Blk. 10, G.C.&S.F.R.R. Sur. ..... Location.

**CULBERSON COUNTY**

Deep Rock Oil Co.'s No. 2 Kloh-Rumsey, Sec. 21, Blk. 29, T. & P. Sur., T-1 (NE of No. 1) ..... Shut down 1,265 ft.

Deep Rock Oil Co.'s No. 1 J. P. Seay ..... Shut down 1,440 ft.

Hickey & Siver's No. 1 C. O. Finley ..... Fishing for bailer 651 ft.

Scott & Dittman's No. 1 Miller, SW cor. NW NE, Sec. 1, School Blk. 97 ..... Rainbow 1,056 ft.; 300 ft. salt water 1,725 ft.; run. 8-in. casing 1,767 ft.

**ECTOR COUNTY**

Pennsylvania Drlg. Co.'s No. 1 W. E. Connell, C NE Sec. 7, Blk. B-16 ..... Location.

Shoup et al's No. 2 C. P. Davis, C Sec. 10, Blk. 42 ..... Moving in material.

**EL PASO COUNTY**

Ellsworth & Haunt's No. 1 McKinney & Jones ..... Rig; drlg. water well.

**FISHER COUNTY**

Cranfill & Reynold's No. 1 J. A. Young, Sec. 208, B. B. B. & C. Sur. ..... Hole full salt water 2,400-35 ft.; swedging 8-in. 2,870 ft.; drlg. by tools.

R. W. Raney's No. 2 Maberry, Sec. 56, Blk. 1, T. & P. Sur. ..... Drlg. 2,875 ft.

Sinclair Oil & Gas Co.'s No. 1 F. Steele, NW NE NE Sec. 72, Blk. 1, H.&T.C.R.R. Sur. ..... Location.

**FOARD COUNTY**

Clark et al's No. 1 Atkins ..... Lime 1,580-1,930 ft.; show gas 1,885 ft.; underreaming 6-in. 2,965 ft.

Fain-McGaha Oil Corp. and Roxana's No. 2 J. F. Mathews, Blk. 3, G. C. & S. F. Sur. ..... Spudded and shut down.

Marland Oil Co.'s No. 1 J. H. Minnick, C NE Sec. 74, Blk. B, H. & T. C. Sur. ..... Rig.

**GARZA COUNTY**

Emerald Oil Co.'s No. 1 Boren, NW NE Sec. 137, Blk. 5,.. Shut down 2,600 ft.

Emerald Oil Co.'s No. 2 Boren, C NW NE Sec. 137, Blk. 5 ..... Top salt 660 ft.; drlg. 1,708 ft.

Gulf Prod. Co.'s No. 1 E. P. Swenson-A, Sec. 67, Blk. 3, H. & G. N. Sur. ..... Top salt 495 ft.; top lime 2,075 ft.; drlg. gray lime 4,625 ft.

Marland Oil Co.'s No. 1 B. F. Pippin, C NW Sec. 1,210, W. C. Young Sur. (3,750-ft. test) ..... Building rig.

**GLASSCOCK COUNTY**

Texon & Marland's No. 1 Settles ..... Set 10-in. 1,420 ft.; top lime 2,015 ft.; hole full sulphur water 2,710-50 ft.; shut down 3,075 ft.

Meriwether Oil Co.'s No. 1 L. S. McDowell, CNL Sec. 34, Blk. 34, T-2-S, T. P. R. R. Sur. ..... Rig.

R. R. Penn's No. 1 Hughes & Johnson ..... Location.

**HOWARD COUNTY**

Bristow & Merrick's No. 1 Dora Roberts ..... Total depth 1,602 ft.; moving star machine.

Bristow & Merrick's No. 5 A. J. Hooks, SE NW N half Sec. 140, Blk. 29, W.&N.W.R.R. Sur. ..... Location.

Coyle-Concord Oil Co.'s No. 4 Dora Roberts, Sec. 156, Blk. 29, W. & N. W. ..... Shot 60 qts. 1,850-77 ft.; cleaning out.

F. H. E. Oil Co.'s No. 1 Dora Roberts, SW NE Sec. 136, Blk. 29, W.&N.W.R.R. Sur. ..... Location.

Green O. & R. Co.'s No. 1 H. R. Clay, SE cor. Sec. 127, Blk. 29, W-NW Sur. ..... Rig.

Henshaw et al's No. 1 W. R. Settles, SW SE SW Sec. 135, Blk. 29 ..... Hole full sulphur water 1,325-30 ft.; drlg. 2,250 ft.

Lockhart et al's No. 2 Dora Roberts, Sec. 157, Blk. 29, W. & N. W. ..... M. O. G.

Marland Oil Co.'s No. 1 Clay-E, NW NE SE Sec. 135, Blk. 29 ..... Pay 2,480-2,500 ft.; swabbed approx. 160 bbls.; hole full salt water 2,360-70 ft.; total depth 2,656 ft.; plugged back to 2,960 ft.; tested 5 bailers oil 2,880-2,920 ft.; shot 100 qts. 2,880-2,920 ft.; tested 10 bbls. oil and 12 bbls. water; plugged back to 2,575 ft.; to pump.

Marland Oil Co.'s No. 1 Richardson, C NW Sec. 12, Blk. 32, T. & P. Sur., T-1-S ..... Top salt 870 ft.; hole full salt water 2,235-2,300 ft.; hole full sulphur water 2,790-2,800 ft. and 3,010 ft.; pulling pipe to abandon 3,618 ft.

Maya, Nixon & Flowers' No. 1 W. J. Flowers ..... Little salt at 976-97 ft.; top salt 1,114 ft.; drlg. 1,822 ft.

Miley and Marland Oil Co.'s No. 1 C. D. Read, C NW, Sec. 12, Blk. 31, T. & P. Sur., T-1-N ..... Spudded and shut down 5 ft.

Owen & Sloan's No. 3 Dora Roberts, Sec. 136, Blk. 29.... Set 8¼ in. 1,316 ft.

Owen & Sloan's No. 4 Dora Roberts, Sec. 136, Blk. 29.... Location.

Sun Oil Co.'s No. 1 W. R. Settles, Sec. 135, Blk. 29..... Top lime 2,030 ft.; drlg. 2,500 ft.

Sprague Oil Co.'s No. 1 Dora Roberts ..... Spudded and shut down.

Sweeney et al's No. 2 Chalk, Sec. 124, Blk. 29 ..... Location.

Sweeney et al's No. 4 Chalk, Sec. 124, Blk. 29 ..... Location.

Tate-Weekley & Tubbs' No. 3 Dora Roberts, NE cor. Sec. 156, Blk. 29, W. & N. W. R. R. Sur. ..... Drlg. 1,450 ft.

Tate-Weekley & Tubbs' No. 4 Dora Roberts, Sec. 156, Blk. 29, W.&N.W.R.R. Sur. ..... Location.

Texon O. & L. Co. and Marland Oil Co.'s No. 1 Mrs. Cannaly, NE cor. Sec. 15, Blk. 33, T. & P. Sur. T-1-N ..... Top salt 1,425 ft.; hole full salt water 1,760-1,800 ft.; show oil 3,065 ft.; hole full sulphur water 3,500-55 ft.; hole full water 3,925-50 ft.; show oil 4,125-36 ft.; preparing to plug 4,400 ft.

Texon O. & L. Co. and Marland Oil Co.'s No. 2 W. R. Settles ..... Shut down for storage; sand at 1,280-,84 ft.; total depth 1,298 ft.

Texon & Marland's No. 2 W. R. Settles-A ..... Rig; drlg. water well.

Weekly Oil Corp. et al's No. 1 Dora Roberts, Sec. 156, Blk. 29 ..... Fishing 1,465 ft.

**HUDSPETH COUNTY**

American Land Co.'s No. 1 Lockhart and Roseborough, C SE Sec. 5, School Blk. 21 ..... Shut down 180 ft. (cor. depth); to start up soon.

Western States Oil Co.'s No. 1 Moore, C SE Sec. 16, Blk. 71, T. & P. Sur., T-4 ..... Shut down for socket 1,175 ft.; 1,000,000 ft. of inflammable gas at 1,130 ft.; drlg. 1,320 ft.

Western States Oil Co.'s No. 1 Gardner & Moseley, NE NW Sec. 12, Blk. 18 ..... Shut down 1,000 ft.

**IRION COUNTY**

P. E. Hill's No. 1 Horney, NE cor. Sec. 2, Blk. 3, H. & T. C. Sur. ..... Hole full water 720-40 ft.; drlg. 1,080 ft.

F. E. Webb et al's No. 1 J. M. Nutt ..... Spudded and shut down 125 ft.

**JEFF DAVIS COUNTY**

J. K. Hughes Dev. Co.'s No. 2 Means ..... Shut down 2,600 ft.

Humble O. & R. Co.'s No. 2 Crecencio Flores, 1,130 ft. N and 850 ft. E of SW cor. Sec. 34, Blk. 58, T. & P. Sur., Twp. 8 ..... Shut down 3,920 ft.

**JONES COUNTY**

Garland & Diamond's No. 1 E. D. Glynn, SE cor. Sec. 18, Deaf & Dumb Asylum Lands ..... Fishing 2,430 ft.

Hutson & Weaver's No. 1-A Smith ..... Swabbing 40 bbls. daily sandy lime 2,498-2,504 ft.; making some water.

Phillips Petroleum Co.'s No. 5 Joe Winters, NE cor. NW Sec. 19, Blk. 19, T.&P.R.R. Sur. ..... Location.

Rhodes & Highers' No. 1 E. Howell, Sec. 20, Blk. 19, T.&P. Sur. ..... Location.

J. N. Sloan and others' No. 1 W. C. Bennett, NW cor. SW SE Sec. 42, Orphan Asylum land ..... Location.

W. G. Stough and others' No. 1 J. P. Willis, J. C. Patterson Sur. No. 2 ..... Shut down 1,740 ft.

**KENT COUNTY**

Marland and Texon's No. 1 Bilby ..... Drlg. 750 ft.

**KNOX COUNTY**

Deep Rock Oil Co.'s No. 1 Moore ..... Drlg. 1,000 ft.

Deep Rock Oil Co.'s No. 1 Big Four, 1,270 ft. S and 2,590 ft. W of NE cor. Sec. 21, Blk. 4 ..... Shut down 2,513 ft.; may deepen to 4,000 ft.

**LOVING COUNTY**

Delaware Oil Co.'s No. 1 Lockhart & Ramsey ..... Shut down 650 ft.

Lockhart Bros.' No. 1 fee, Sec. 35, Blk. 33, H. & T. C. Sur. ..... Drlg. by tools 2,200 ft.

Owens & Sloan's No. 1 W. D. Johnson, C SE Sec. 20, Blk. 53, T-2, T. & P. Sur., elev. 2,934 ..... Top salt 955 ft.; half bailer sulphur water per hr. 3,600 ft.; drlg. 3,975 ft.; water exhausted.

**LYNN COUNTY**

Elpe Oil Co.'s No. 1 Nevols, NW cor. Sec. 6, Blk. C-42, School Lands ..... Shut down 675 ft.

Hart Oil Corp.'s No. 1 C. O. Edwards A-1 ..... Shut down 576 ft.

**MENARD COUNTY**

Carpenter & Robbins' No. 1 Kothman, NW cor. SW SW Sec. 22 ..... 165 ft. 34.6 grav. oil at 414-16 ft.; fishing 415 ft.

J. C. Barnett and T. H. Drake's No. 1 Callan City Co. Ranch, Sec. 22 ..... Drlg. 528 ft.

Renfro et al's No. 1 J. Davis ..... Shut down 260 ft.

**MIDLAND COUNTY**

Gholson et al's (was Orbit Oil Co.'s) No. 1 Moreland, C SE Sec. 17, Blk. 39, T. & P. Sur., T-1-S ..... Shut down 1,650 ft. for underreaming.

Shoup et al's No. 1 Roy Parks ..... Drlg. 50 ft.

**MITCHELL COUNTY**

Boehm Drilling Co.'s No. 1 Harry Hyman, CNW SE Sec. 90, Blk. 29, W. & N. W. Sur. ..... Shut down 505 ft.

Magnolia Oil Co.'s No. 5 Foster, Sec. 17, Blk. 29, T. & P... Drlg. 1,230 ft.

Paul Teas et al's No. 1 A. C. Mills, NW cor. C. A. O'Keefe Sub. 11, J. P. Smith Sur. ..... Total depth 1,766 ft. (s.l.); plugged back to 1,650 ft.; shot 200 qts. 1,550-1,640 ft.; cleaning out.

Robert Thraves' No. 1 C. Way, Sec. 91, Blk. 27, T. & P. Sur., T-1-N ..... Total depth 2,508 ft.; shut down.

**PECOS COUNTY**

Benedum & Trees' No. 1 B. T. Corder ..... Rig.

Bob Elmore's No. 2 Holmes ..... Top salt 435 ft.; shut down 640 ft.

Buell & Hagan's No. 1 Pryor & Wilson, Sec. 15, Blk. 5 .... Rig.

Diamond Pet. Co.'s No. 1 Blackstone & Slaughter ..... Location.

M. C. Dibble & Hale's No. 1 Bonebrake, Sec. 115, Blk. 8, H. & G. W. Sur., elev. 2,555 ft. ..... Shut down 640 ft.

Furman Oil Co.'s No. 1 T. W. McNear, Jr., Sec. 46, Blk. 9 ..... Location.

Everett et al's No. 1 J. Fields ..... Spudded and shut down.

Gibson Oil Corp.'s No. 1 R. R. Russell ..... Drlg. 1,825 ft.

George A. Henshaw et al's No. 1 B. T. Corder, C SW Sec. 74, Blk. 2, C. C. S. D. Sur. ..... Top salt 1,130 ft.; shut down 2,517 ft.

Kershaw & Livingston's No. 1 Cannon, Sec. 54, Blk. A-2 Drlg. 1,365 ft.; top salt 1,050 ft.

Mid-Kansas O. & G. Co.'s No. 1 Pryor &Wilson, NW cor. Sec. 3, Blk. 5, T. C. R. R. Sur. ..... Drlg. 200 ft.

Miller & McNess' No. 1 W. C. Tyrrell ..... Cellar.

Phillips Pet. Co.'s No. 1, SE cor. Sec. 8, Blk. 125 ..... Location.

B. J. Spikes' No. 1 George Brown ..... Shut down 625 ft.

Rowan & Tong's No. 1 Scharff & Blackman, Sec. 4, Blk. 9 ..... Location.

Roxana Petroleum Corp.'s No. 1 University, Sec. 25, Blk. 26 ..... Moving in rig.

Stidham & Thrasher's No. 1 Belgrade Ranch Co., Sur. 3, Mrs. S. Tompkins A-4,695 ..... One bailer sulphur water per hr. 1,310-15 ft.; shut down 1,460 ft.

Transcontinental Oil Co.'s No. 1 Blackstone & Slaughter, Sec. 29, Blk. 139, St. L. Sur., elev. 3,539 ft. ..... 250 ft. sulphur water in black sand 1,150-80 ft.; small show oil 1,510 ft.; show gas 1,540 ft.; show oil 2,080 ft.; brown sand 3,560-70 ft.; 250,000 ft. gas at 3,565 ft.; to abandon at 4,985 ft.

Transcontinental Oil Co.'s No. 1 University, NE NW SW Sec. 18, Blk. 18 ..... Drlg. 110 ft.

Vacuum Oil Co.'s No. 1 Elsinore Cattle Co. ..... Drlg. 830 ft.

World Oil Co.'s No. 1 Kloh, Sec. 47, Blk. 45, Twp. 8, T. P. R. R. Sur., elev. 2,810 ft. ..... Shut down 730 ft.

World Oil Co.'s No. 1 Serf, C NE Sec. 10, Blk. 130, T. & St. L. Sur., elev. 3,425 ft. ..... Shut down 888 ft.

**Yates Pool, Pecos County**

Pandem Oil and Gibson Oil Co.'s (was Allsman & Bell's) No. 6 River Bed ..... Rig.

Pandem Oil and Gibson Oil Co.'s (was Allsman & Bell's) No. 8 River Bed ..... Hole full of fluid, 35% water; shut down 1,095 ft.

Pandem Oil and Gibson Oil Co.'s (was Allsman & Bell's) No. 9 River Bed ..... Location.

Pandem Oil and Gibson Oil Co.'s (was Allsman & Bell's) No. 12 River Bed ..... Setting 6-in. casing 1,020 ft.

Pandem Oil and Gibson Oil Co.'s (was Allsman & Bell's) No. 13 River Bed ..... Location.

Pandem Oil and Gibson Oil Co.'s No. 14 River Bed ..... Location.

Pandem Oil and Gibson Oil Co.'s No. 15 River Bed ..... Location.

California Co.'s No. 2 Yates, Sec. 34, Blk. 194 ..... Rig.

California Oil Co.'s No. 14 I. G. Yates, Lease 1, Sec. 34, Blk. 194 ..... Location.

California Oil Co.'s No. 15 I. G. Yates, Lease 1, Sec. 34, Blk. 194 ..... Location.

California Oil Co.'s No. 16 I. G. Yates, Lease 1, Sec. 34, Blk. 194 ..... Location.
California Co.'s No. 10 Smith, Lease 3 ..... Shut down 1,030 ft.
California Co.'s No. 11 Smith, Lease 3 ..... Drlg. 1,241 ft.
California Co.'s No. 12 Smith, Lease 3 ..... Drlg. 550 ft.
Day Bros. & McKnight's No. 1 Yates, NW cor. Sec. 58, Blk. 1 ..... Top salt 440 ft.; drlg. 1,290 ft.; 1,000,000 ft. gas 1,255 ft.
Douglas Oil Co.'s No. 2 J. T. Sellman ..... Hole full salt water 795-860 ft.; 25 ft. sulphur water 1,614-15 ft.
Gulf Prod. Co.'s No. 9 Smith-A ..... Drlg. 1,421 ft.; pinched to 30 bbls. per hr.
Gulf Prod. Co.'s No. 8, I. G. Yates, Runnels Co. School Land No. A-2,169 ..... Pumper 285 bbls. 11 hrs. from sand 405-49 ft. showing 17 per cent b.s. and water which treats out 18-gravity oil.
Humble O. & R. Co.'s No. 7 M. A. Smith, SW cor. NW Sec. 36, Blk. 194 ..... Location.
Kirby Petroleum Co.'s No. 1 J. H. Tippett, CWL E half W half, Sec. 40, Blk. 194 ..... Location.
McDonald et al's No. 1 A. A. Parsell, C NW SE Sec. 28, Blk. A, G. C. & S. F. R. R. Sur. ..... Rig.
McMan and Marland's No. 16 Yates ..... Rig.
Marland Oil Co.'s No. 11 Yates-A ..... Location.
Marland Oil Co.'s No. 12 Yates-A ..... Location.
Marland Oil Co.'s No. 13 Yates-A ..... Location.
Michaelson & Tabot's No. 1 River Bed ..... Spudded and shut down.
Mid-Kansas and Transcontinental's No. 14 Yates-A, Sec. 33, Blk. 194, G.C.&S.F. Sur. ..... Waiting on machine.
Mid-Kansas and Transcontinental's No. 15 Yates-A ..... Drlg. 700 ft.
Mid-Kansas and Transcontinental's No. 16 Yates-A ..... Drlg. 1,000 ft.
Mid-Kansas and Transcontinental's No. 17 I. G. Yates-A, Sec. 31, Blk. 194 ..... Location.
*Mid-Kansas and Transcontinental's No. 12 Yates-B, Sec. 61, Blk. 1 ..... Drlg. 1,200 ft.
Mid-Kansas and Transcontinental's No. 18 Yates-B ..... Show oil 1,095 ft.; flowed sulphur water 1,108 ft.; plugged back to 1,087 ft.; 400 ft. water; 300 ft. oil in hole.
Mid-Kansas and Transcontinental's No. 19 Yates-B ..... Top pay 1,118 ft.; shut down 1,310 ft.; flowed 1,807 bbls. in 9 hrs. through 1 4-in. line.
Mid-Kansas and Transcontinental's No. 22 Yates-B ..... Drlg. 400 ft.
Mid-Kansas and Transcontinental's No. 6 Yates-C ..... Rigging up.
Mid-Kansas and Transcontinental's No. 10 Yates-C ..... Location.
Mid-Kansas and Transcontinental's No. 1 Yates-F ..... Top pay 1,152 ft.; drlg. 1,249 ft.; flowed 125 bbls. 24 hrs.
Mid-Kansas and Transcontinental's No. 2 M. A. Smith .. First oil and gas show 1,095 ft.; top pay 1,110 ft.; shut down 1,245 ft.; flowing 97 bbls.
Mid-Kansas and Transcontinental's No. 9 Smith-Taylor... Waiting on machine.
Mid-Kansas and Transcont.nental's No. 1 I. G. Yates-G, Sec. 34½, Blk. 194 ..... Location.
Mid-Kansas and Transcontinental's No. 10 Smith-Taylor.. Top pay 1,264 ft.; drlg. 1,339 ft.; flowing by heads.
Mid-Kansas and Transcontinental's No. 11 Smith-Taylor.. Set 6-in. casing 1,180 ft.
Mid-Kansas and Transcontinental's No. 12 Smith-Taylor.. Drlg. 1,328 ft.; top pay 1,310 ft.; flowed 1,542 bbls. in 11 hrs.
Mid-Kansas and Transcontinental's No. 13 Smith-Taylor.. Drlg. 100 ft.
Mid-Kansas and Transcontinental Co.'s No. 14 Smith-Taylor, Sec. 33, Blk. 194, G. C. & S. F. R. R. Sur. .... Cellar.
Oregon Oil Corp.'s No. 1 Yates ..... Shut down 835 ft.
Phillips Pet. Co.'s No. 1 Mrs. M. A. Smith ..... Shut down 1,350 ft. for storage; top pay 1,255 ft.; est. 200 bbls. daily.
Skelly Oil Co.'s No. 1 J. H. Tippett, Runnels County School Land A-2,169, Sec. 108, Blk. 194, G. C. & S. F. R. R. ..... Rig.

**PRESIDIO COUNTY**

Headlock & Miller's No. 1 Tootle Est., Sec. 123, Blk. 3, D. & P. Sur., elev. 2,912 ft. ..... Salt water 2,610 ft.; total depth 3,003 ft.; shut down for orders.
Pinto Canyon Oil Co.'s No. 1 Fields, 1,760 ft. S and E NW cor. Sec. 74, Blk. 2, D. & P. Sur. ..... Location.

**REAGAN COUNTY**

California Oil Co.'s No. 4 University, NW cor. Sec. 3, Blk. 7 ..... Spudded and shut down.
Hagan & Emch's No. 1 E. W. Loftin ..... Drlg. 1,400 ft.
Marland Oil Co.'s No. 1 University, SE cor. SW Sec. 26, Blk. 8 ..... Rig.
Moody Oil Co.'s No. 1 R. A. Walters ..... Rig.
Roxana Pet. Co.'s No. 1 Sawyer Cattle Co., 3,000 ft. S of CNL Sec. 15, Blk. A, R. Casey Sur. ..... Rig.
Skelly Oil Co.'s No. 2 University, SE SW SE Sec. 35, Blk. 8 ..... Location.
The Texas Company's No. 3 J. D. Sugg, C Sec. 165, Blk. 2, T.&P.R.R. Sur. ..... Location.
Texon O. & L. Co.'s No. 1-B University, Group 1 ..... Top pay 6,250 ft.; 2,000 ft. oil; drlg. 7,680 ft. black lime and shale.
White et al's No. 1 Shofner & Sterling, NE cor. NW Sec. 10, 2 m. N of Big Lake ..... Top salt 1,275 ft.; hole full fresh water 2,155 ft.; run. 8-in. 2,175 ft.; drlg. 2,405 ft.

**REEVES COUNTY**

Exploration Co.'s No. 1 A. A. Kinney, 1,500 ft. W of NE cor. Sec. 26, Blk. C-18, Public School Land, elev. 2,847 ft. ..... Show oil 1,105-10 ft.; hole full sulphur water 1,600 ft.; water shut off; drlg. white lime 1,760 ft.
Grisham-Hunter Corp.'s No. 1 Rathge & Connor, 600 ft. from N line and 5,760 ft. from W line of Sec. 26, Blk. 2, H. & G. N. ..... Hole full fresh water; drlg. 950 ft.
David R. Thompson's No. 1 A. A. Eddins ..... Total depth 5,130 ft.; shut down; to drill deeper.
Vacuum Oil Co.'s No. 1 Grisham-Hunter ..... Set 15½-in. casing 533 ft.; set 12½-in. 1,025 ft.
World Oil Co.'s No. 1 Biggs, C SE Sec. 65, W. N. Holder Sur. ..... Shut down black lime 2,576 ft.; working over.
World Oil Co.'s No. 1 Duff, 1,500 ft. from S and 850 ft. from NE lines, R. S. Johnson Sur. No. 68, elev. 2,774 ft. ..... Top Delaware lime 4,185 ft.; hole full brackish salt water 4,362-4,500 ft.; plugged back to 4,227 ft.; shot 70 qts. 4,135-4,235 ft.; little oil in hole; shut down 4,500 ft.; moved tools to No. 1 Biggs.

**RUNNELS COUNTY**

Empire G. & F. Co.'s No. 1 C. C. Gray ..... Hole full fresh water 2,250-57 ft.; small show oil 2,460-90 ft.; cleaning out 2,540 ft.
Gibson & Johnson's No. 1 Harris Est., Juliana Voske Cabrera Sur. ..... Location.
Gibson & Johnson's No. 1 H. P. Serratt, C SE NW Sec. 150, E. T. R. R. Sur. ..... Underreaming 1,570 ft.
Globe Oil Co.'s No. 1 J. H. Webb ..... Straightreaming 1,385 ft.
Jones Oil Syndicate's No. 1 W. Hale ..... Fish. pipe 1,905 ft.
Jones Oil Syndicate's No. 1 W. Hale (Runnells), NE cor. Sub. 29, Sec. 109, E. T. R. R. Co. sur. ..... New location.
McLean et al's No. 1 G. W. Clayton ..... Shut down 1,050 ft.
Marland Oil Co.'s and E. L. Smith Oil Co.'s No. 1 A. C. Herring, C Sec. 121, E. T. R. R. Sur. (3,000-ft. test).. Rig.
Marland Oil Co.'s No. 1 R. R. Russell, near CSL J. F. G. Sur. ..... New location.
Kennedy et al's No. 1 J. E. Tally ..... Shut down 1,720 ft.
May et al's No. 1 J. M. Schneider, John Wall Sur. ..... ⅛ bailer salt water 1,033 ft.; hole full water 1,100-20 ft.; underreaming 1,325 ft.
Miles Oil Co.'s No. 1 Charles Ray, Sec. 21, T. & N. O. Sur. ..... Cellar and machine.
Miles Oil Co.'s No. 1 L. S. Lawhon, NE cor. Sec. 68 ..... Show gas 960-80 ft.; shut down for 6-in. 2,310 ft.
Royal Pet. Co.'s No. 1 A. C. Willingham ..... Preparing to run 10-in. 1,410 ft.
Willix Pet. Co.'s No. 1 Malone ..... Location.
R. B. Summers et al's No. 1 J. W. Reese, M. J. Farramore Sur. No. 26 ..... Location.
Swensondale Oil Co.'s No. 1 E. A. Werner ..... Hole full water 2,000 ft.; shut down 2,080 ft.
Vacuum Oil Co.'s No. 2 R. M. McMillan ..... Underreaming 8¼-in. casing 2,140 ft.
Watchorn O. & G. Co.'s No. 1 J. L. King ..... Hole full salt water 1,633-91 ft. Underreaming 2,720 ft.

**SCHLEICHER COUNTY**

Beavers & Leath et al's No. 1 J. A. and W. T. Whitten, C NW Sec. 35, Blk. 11, T. O. Sur. ..... Shut down 400 ft.

**SCURRY COUNTY**

J. B. Mims et al's No. 1 J. J. Koonsman, Sec. 220, Blk. 2, H. & T. C. Sur. ..... Tearing down rig to move to new location.

**STERLING COUNTY**

Orr et al's (to be taken over by Empire G. & F. Co.) No. 1 Neal Reed, CNL Sec. 15, Blk. 30, W. & N. W. Sur. ..... Shut down 1,390 ft. (cor.).

**SUTTON COUNTY**

National Potash Co.'s No. 1 J. N. Ross ..... Coring lime 991 ft.

**TAYLOR COUNTY**

A. J. Brown et al's No. 1 Hensley, NE cor. Sec. 5, Blk. 4, S. P. R. R. Survey ..... Drlg. 2,934 ft.
Dorsing & Perrine's No. 1 J. A. Hammer, C N 100 acres, Sec. 23, Blk. 19, T. & P. Sur., elev. 1,904 ft. ... Shut down 455 ft.
Gilbert Johnson and Day Bros.' No. 1 C. M. Brown, Sec. 1, Blk. 6, T. & P. Sur. ..... Hole full water 2,170-2,220 ft. underreaming 8¼-in. casing 2,450 ft.
Owen & Sloan's No. 1 Lattimer, Sec. 14, Blk. 9, T. & P. Sur. ..... Shut down 2,825 ft.

**TERRELL COUNTY**

Big Bend Oil Co.'s No. 1 Bassett ..... Location.
Champlin Ref. Co.'s No. 1 Corder, C Sec. 110, Blk. 1, C. C. S. D. Sur. ..... Set 15½-in. 625 ft.; drlg. 1,340 ft.
Reep Rock Oil Co.'s No. 1 H. C. Nolke, Sec. 4, Blk. A-2, T. C. R. R. Sur. ..... Drlg. 1,015 ft.
Humble Oil Co.'s No. 1 University, Sec. 15, Blk. 34 ..... Shut down for fish. tools 900 ft.
Keck Pecos Trust Co.'s No. 1 Hamilton, C Sec. 6, Blk. D-7, E.L.&R.R. Sur. ..... Location.
Milham Exploration Co.'s No. 1 Bassett, Sec. 77, Blk. Y, W. H. Robertson Sur. ..... Run. 8-in. 1,788 ft.; fish. 2,400 ft.
Miller Bros.' No. 1 Allison & Burke, CNW Sec. 10, Blk. 176, Texas-Mex. R. R. Sur. ..... Building rig.
Woodley & Jones' No. 1 Pankenham, C SE NW Sec. 43, Blk. B-2, C. C. S. D. R. G. & N. G. R. R. Sur. .... Rig.

**TERRY COUNTY**

Kingsland O. & P. Co.'s No. 1 Brownfield, C NW SW SW Sec. 7, Blk. 1-A, E. L. R. R. Sur. ..... Slight show gas 2,230 ft.; fish. for tools 3,360 ft.

**TOM GREEN COUNTY**

George Amery's No. 1 Wilkey, C SW Sec. 3, B. A. L. Sur. ..... Location.
Collins et al's No. 1 Jones, CSL Sec. 646, Shaffer Sur. .... Rig.
Cox et al's No. 1 Llano ..... Drlg. 610 ft.
Fitzgerald & Taliaferro's No. 1 Bennett ..... Trying to shut off water 1,920 ft.
Long Eagle Oil Co.'s No. 1 Sharp, SE W Eitzel Sur. No. 167 ..... Rig.
Marland Oil Co.'s No. 1 J. W. Johnson, C SE Sec. 6, R. B. Sanderson Sur. ..... Hole full water 2,020-45 ft.; shut down 3,500 ft.
Marland Oil Co.'s No. 1 J. W. Johnson-A ..... Fishing 3,130 ft.; setting 6-in. casing. 3,173 ft.; drlg. 3,214 ft.
Tulsa Oil Co.'s No. 1 Adams, C SW Sec. 163, Blk. 11, S. P. R. R. Sur. ..... Shut down 1,020 ft.
Haubelt et al's No. 1 Johnson ..... Location.
Haubelt et al's No. 2 Johnson ..... Shut down 1,301 ft.
World Oil Co.'s No. 1 Mrs. F. T. March ..... Location.
World Oil Co.'s No. 2 Pulliam, Sec. 25, Blk. 4, H. & T. C. Sur., elev. 1,823 ft. ..... Set 8-in. casing 655 ft. and shut down.

**UPTON COUNTY**

Mark Curtis et al's (was Hultz et al's) No. 2 Giddings, 5,336 ft. S and 6,678 ft. E of NW cor. Throckmorton C. School Land, League 1, elev. 2,757 ft. .... ..... Shut down 975 ft.
The Texas Company and Cordova Union's No. 1 Union Land, Sec. 23, Blk. 35, H. & T. C ..... Top pay 2,098 ft.; swabbed 60 bbls. in 36 hrs. at 2,271 ft., 2 per cent water; 2,200 ft. sulphur water 2,390-2,405 ft.; shut down 3,125 ft.; plugging back.
Wise & Jackson's No. 1 J. H. Porter, SW cor. SW SW Sec. 184, Blk. E, elev. 2,592 ft. ..... Top pay 3,419 ft.; total depth 3,517 ft., gray lime; shut down.

**VAL VERDE COUNTY**

A. Blume et al's No. 1 Moore Est., Sec. 183, J. Mitchell Sur., elev. 953 ft. ..... Shut down 3,000 ft.
Curso Williams' No. 1 Holman, NE NE Sec. 5, Blk. N, G. H. & S. A. Sur. ..... Shut down 2,940 ft.
East Del Rio Oil Co.'s No. 1 Russell, SE cor. Sec. 183, Del Rio Town Sur., elev. 941 ft. ..... Total depth 3,190 ft.; shut down.
Magnolia Pet. Co.'s No. 1 Whitehead, Sec. 81, D. G. C. & S. F. Sur., elev. 1,770 ft. ..... Drlg. 6,210 ft.
Independent Operator's No. 1 Whitehead, SE SE Sec. 30, Blk. 4, I. & G. N. Sur., elev. 1,175 ft. ..... Shut down 3,900 ft.
O. O. Owens' No. 1 Mills, Sec. 128, Blk. 1, I. & G. N. Sur., elev. 2,130 ft. ..... Gas sand 2,491-2,520 ft.; tested 125,750 ft. gas; reset 8-in. 2,511 ft.; shut down 4,310 ft.
W. B. Thraves et al's No. 1 W. E. Wilson ..... Shut down 905 ft.

**WARD COUNTY**

Alfredo Del Cambre's No. 1 Lee Monroe, Sec. 50, Blk. 33, H.&T.C. Sur. ..... Spudded and shut down.
E. H. Devore et al's No. 1 Black, Sec. 214, Blk. 34, H.&T.C. ..... Spudded and shut down.
Selby Oil Co. et al's No. 1 A. G. Dooley et al, Sec. 85, Blk. A, G. M. M. & A. Sur. ..... Rigging up rotary 500 ft.

**WINKLER COUNTY**

Amerada Pet. Corp.'s No. 1 J. B. Walton, SW cor. NW Sec. 48, Blk. 26, elev. 2,833 ft. ..... Rerun 8-in.; water shut off; making 15,000,000 ft. gas and slight spray oil; drlg. 2,440 ft.
Atlantic O. P. Co.'s No. 2 Grisham-Hunter-A, Sec. 34, Blk. B-5 ..... Shot 480 qts. 2,850-2,999 ft.; total depth 2,985 ft.; shot 960 qts. 2,800-2,991 ft.; no results; fish. for bailer.
Atlantic O. P. Co.'s No. 3 Grisham-Hunter-A, Sec. 34, Blk. B-5 ..... Topped salt 1,315 ft.; top lime 2,525 ft.; drlg. 2,995 ft.; 40 bbls. per hr.
Atlantic O. P. Co.'s No. 4 Grisham-Hunter-A, Sec. 34, Blk. B-5 ..... Top salt 1,470 ft.; top lime 2,472 ft.; shut down 3,032 ft.; flowing 70 bbls. hr.
Atlantic O. P. Co.'s No. 5 Grisham-Hunter-"A", SW NE SW Sec. 34, Blk. B-5 ..... Drlg. 1,046 ft.
Atlantic O. P. Co.'s No. 6 Grisham-Hunter, NW cor. SE SW Sec. 34, Blk. B-5 ..... Drlg. 900 ft.
Atlantic O. P. Co.'s No. 2 Grisham-Hunter-E, NW cor. Sec. 41, Blk. B-5 ..... New location.
Atlantic O. P. Co.'s No. 3 Grisham-Hunter-"E", CNL N half NE Sec. 41, Blk. B-5 ..... Location.
Atlantic O. P. Co.'s No. 4 Grisham-Hunter-E, SE NE NE Sec. 41, Blk. B-5 ..... Spudding.
Atlantic O. P. Co.'s and Collett's No. 3 Hendricks-F, NW NE NW Sec. 40, Blk. 46 ..... Drlg. 600 ft.
Atlantic O. P. Co.'s No. 1 Grisham-Hunter-C (was Lemar) SW cor. Sec. 40, Blk. B-5 ..... Total depth 2,978 ft.; gas pressure split connections; est. 75,000,000 ft. gas; running wild; trying to kill gas; top salt 1,573 ft.; top lime 2,200 ft.
Atlantic O. P. Co.'s No. 2 Ida Hendricks-D, NW SE NW Sec. 29, Blk. B-5 ..... Rigging.
Atlantic O. P. Co.'s No. 4 Ida Hendricks-D, NE SW NW Sec. 29, Blk. B-5 ..... Rigging.
Atlantic O. P. Co.'s No. 5 Ida Hendricks-D, SW SE S half NW Sec. 29, Blk. B-5 ..... Location.

Atlantic O. P. and Collett's No. 1 Ida Hendricks-F, NE cor. W half NW Sec. 40, Blk. 26 ..... Show gas 2,522 ft.; set 6-in. casing. 2,685 ft.; 1 5-bbl. head and 5,000,000 ft. gas; shut down 2,733 ft.; preparing to deepen.

Atlantic O. P. and Collett's No. 2 Ida Hendricks-F ..... Drlg. 2,000 ft.

T. T. Bolin et al's No. 1 Brown ..... Shut down 260 ft. for bit.

Cranfill & Reynolds' No. 2 Hendricks-C, SW SE SW Sec. 33, Blk. 76 ..... Drlg. 1,320 ft.

Cranfill & Reynolds' No. 1 Hendricks-C ..... Cem. 8-in. 2,408 ft.; top lime 2,408 ft.; top salt 1,751 ft.; 12,000,000 ft. gas; show oil; total depth 2,733 ft.; shut down.

Danciger et al's No. 1 John Sealy, SW cor. NE Sec. 93, Blk. A, G.M.M.B.&A. Sur. ..... Location.

Eastland Oil Co. and Arnold's No. 1, Sec. 35, Blk. B-5 ... Show oil 2,675 ft.; top pay 2,710 ft.; drlg. by tools 2,755 ft.; flowing 60 bbls.

Gibson-Johnson's No. 1 Leck, C SW Sec. 3, Blk. 74..... Drlg. 1,650 ft.

Gulf Prod. Co.'s No. 2T. G. Hendricks, NE NW NW Sec. 34, Blk. B-5 ..... Rig standing.

Gulf Prod. Co.'s No. 8 T. G. Hendricks, Sec. 34, Blk. B-5.. Show oil and gas in lime 2,483 ft.; top lime 2,480 ft.; standardizing 2,486 ft.

Gulf Prod. Co.'s No. 9 T. G. Hendricks, Sec. 34, Blk. B-5.. Top salt 1,837 ft.; standardizing 2,562 ft.

Gulf Prod. Co.'s No. 10 T. G. Hendricks, SW cor. NE Sec. 45, Blk. 26 ..... Top salt 1,973 ft.; moving boilers back; shut down brown lime 2,462 ft.

Gulf Prod. Co.'s No. 11 T. G. Hendricks, Sec. 34, Blk. B-5.. Drlg. anhydrite 2,167 ft.

Gulf Prod. Co.'s No. 12 T. G. Hendricks, Sec. 34, Blk. B-5.. Drlg. red rock 760 ft.

Gulf Prod. Co.'s No. 13 T. G. Hendricks, Sec. 40, Blk. B-5.. Drlg. 1,740 ft.

Gulf Prod. Co.'s No. 15 T. G. Hendrick, C NW SW NW Sec. 40, Blk. B-5 ..... Spudding.

Humble O. & R. Co.'s No. 1 Hendricks-C, SE cor. Sec. 32, Blk. 26 ..... Drlg. 745 ft.

Humble O. & R. Co.'s No. 1 J. B. Walton-B, SE cor. N half Sec. 47, Blk. 26 ..... Derrick.

Humble O. & R. Co.'s No. 1 J. B. Walton-A, NW cor. Sec. 48, Blk. 26 ..... Derrick.

Humble O. & R. Co.'s No. 2-A Sec. 34, Blk. B-5 ..... Top salt 1,340 ft.; top lime 2,228 ft.; shut down 2,500 ft.

Humble O. & R. Co.'s No. 3 Grisham-Hunter, Sec. 34, Blk. B-5 ..... 5,000,000 ft. gas from 2,195 ft.; spraying 100 bbls. 2,896 ft.; killing well to deepen; total depth 2,898 ft.; shut down.

Humble O. & R. Co.'s No. 6 Grisham-Hunter ..... Top salt 1,720 ft.; drlg. 2,354 ft.

Humble O. & R. Co.'s No. 7 Grisham-Hunter ..... Top salt 1,240 ft.; drlg. 1,380 ft.

Humble O. & R. Co.'s No. 8 Grisham-Hunter ..... Top salt 1,340 ft.; drlg. 2,195 ft.

Humble O. & R. Co.'s No. 9 Grisham-Hunter, NE NE Sec. 34, Blk. B-5 ..... Cellar.

Humble O. & R. Co.'s No. 1- Grisham-Hunter, SW cor. W half, NW Sec. 41, Blk. B-5 ..... Location.

Humble O. & R. Co.'s No. 4 Ida Hendricks-B, SE N half SE Sec. 29, Blk. B-5 ..... Drlg. 430 ft.

Humble O. & R. Co.'s No. 5 Ida Hendrick-"B", NW NE SE Sec. 29, Blk. B-5 ..... Drlg. 230

Humble O. & R. Co.'s No. 6 Ida Hendrick-"B", NE NW SE Sec. 29, Blk. B-5 ..... Drlg. 200 ft.

Independent O. & G. Co.'s No. 3 Grisham-Hunter, SE NW SW Sec. 34 ..... Drlg. 375 ft.

Independent O. & G. Co.'s No. 4 Grisham-Hunter, NE SW SW Sec. 34 ..... Drlg. 1,031 ft.

Independent O. & G. Co.'s No. 1 Vardeman-B, SE cor. E. half NW Sec. 41, Blk. B-5 ..... Top salt 1,775 ft.; top pay 2,575 ft.; total depth 2,743 ft.; 8,931 bbls. in 24 hrs.; pinched.

Independent O. & G. Co.'s No. 3 Vardeman-B, SE NE NW Sec. 41, Blk. B-5 ..... 8-in. casing 2,328 ft.; drlg. 2,345 ft.

Independent O. & G. Co.'s No. 4 Vardeman-B, SW cor. E half NW Sec. 41, Blk. B-5 ..... Drlg. 990 ft.

Independent O. & G. Co.'s No. 5 Vardeman-B, NW SE NW Sec. 41, Blk. B-5 ..... Drlg. 600 ft.

Independent O. & G. Co.'s No. 1 E. W. Cowden, SE NW NW Sec. 36, Blk. B-5 ..... Standardizing 2,285 ft.

Liner Drlg. Co.'s No. 1 Seth-Campbell, NE cor. Sec. 2, Blk B-5 ..... Shut down 450 ft.

Landreth and Roxana's No. 1 Hendricks-A, SE cor. SW Sec. 29, Blk. B-5 ..... Top salt 1,395 ft.; top lime 2,661 ft.; drlg. 3,050 ft.

Landreth and Roxana's No. 2 Ida Hendricks-A, Sec. 29, Blk. B-5 ..... Top salt 1,440 ft.; drlg. 1,740 ft.

Landreth and Roxana's No. 5 Ida Hendrick-A, NW NE SW Sec. 29, Blk. B-5 ..... Location.

Llano Oil Co.'s No. 1 F. B. Armstrong, at common cor. Secs. 12, 13, 18 and 19, Blk. B-6, School Land ..... Location.

Mariand Oil Co.'s No. 1 T. G. Hendricks, SE cor. W half Sec. 33, Blk. 26 ..... Moving in material.

Mariand Oil Co.'s No. 2 T. G. Hendricks, NE SE SE Sec. 33, Blk. 26 ..... New location.

Mariand Oil Co.'s No. 3 T. G. Hendricks, NE SE SW Sec. 33, Blk. 26 ..... New location.

Magnolia Pet. Co.'s (was G. M. Church et al's) No. 2 Ida Hendricks ..... Show oil 2,750 ft.; top pay 2,865 ft.; total depth 2,961 ft.; ran 5-in. with packer to 2,955 ft.; failed to shut off water; plugging back.

Magnolia Pet. Co.'s No. 3 Ida Hendricks ..... Total depth 2,763 ft.; top lime 2,423 ft.; flowing 110 bbls.; rigging up cable tools.

Magnolia Pet. Co.'s No. 5 Ida Hendricks ..... Top salt 1,624 ft.; top lime 2,509 ft.; total depth 2,915 ft.; flowing 300 bbls., 90 per cent water; waiting orders.

Magnolia Pet. Co.'s No. 6 Ida Hendricks, Sec. 29, Blk. B-5 ..... Top salt 1,430 ft.; top lime 2,426 ft.; top pay 2,750 ft.; drlg. 2,775 ft.; flowing 40 bbls.

Magnolia Pet. Co.'s No. 7 Ida Hendricks ..... Top lime 2,448 ft.; drlg. 2,580 ft.

Magnolia Pet. Co.'s No. 8 Ida Hendricks ..... Drlg. 900 ft.

Murchison Oil Co. et al's No. 1 Grisham-Hunter-B, NE cor. SW SW Sec. 35, Blk. B-5 ..... Top salt 1,335 ft.; shut down 2,427 ft.

Murchison Oil Co. et al's No. 2 Grisham-Hunter-B ..... Location.

Murchison Oil Co. et al's (was Mariand Oil Co.'s) No. 4 Grisham-Hunter-B ..... Top lime 2,500 ft.; reaming hole 2,884 ft.

Mining & Engineering Co.'s No. 1 T. G. Hendricks, Sec. 10, Blk. B-12 ..... Drlg. 771 ft.

Murchison Oil Co. and Cranfill Bros.' No. 2 Grisham-Hunter-A ..... Location.

Murchison Oil Co. and Cranfill Bros.' No. 4 Grisham-Hunter ..... Location.

Pure Oil Co.'s No. 4 Hendricks ..... Drlg. 1,566 ft.

Pure Oil Co.'s No. 5 Hendricks ..... Top salt 1,643 ft.; drlg. 2,288 ft.

Pure Oil Co.'s No. 1 Hendricks-B, NE cor. SE Sec. 34, Blk. B-5 ..... Show gas 2,350-60 ft.; show oil 2,330 ft.; 15,000,000 ft. gas at 2,490 ft.; more gas 2,564 ft.; 40,000,000 ft. gas at 2,720 ft.; rigging cable tools 2,731 ft.

Pure Oil Co.'s No. 2 Hendricks-B ..... Top lime 2,387 ft.; top pay 2,890 ft.; drlg. 2,945 ft.; flowing 1,262 ft. daily.

Pure Oil Co.'s No. 3 Hendricks-B ..... Cem. 8-in. 2,438 ft.; 6,000,000 ft. gas 2,600 ft.; top pay 2,900 ft.; drlg. 2,946 ft.; flowing 570 bbls. daily.

Pure Oil Co.'s No. 4 Hendricks-B ..... Shut down 2,405 ft.; top lime 2,404 ft.

Pure Oil Co.'s No. 5 Hendricks-B, SE SW SE Sec. 34, Blk. B-5 ..... 8-in. casing 2,422 ft.; total depth 2,431 ft.; top lime 2,420 ft.

Pure Oil Co.'s No. 6 Hendricks-B ..... Top salt 1,315 ft.; top lime 2,383 ft.; shut down 2,390 ft.

Pure Oil Co.'s No. 1 Grisham-Hunter-C ..... Cem. crevice 1,418 ft., 1,300 sacks.

Pure Oil Co.'s No. 6 Grisham-Hunter, NW SW Sec. 41, Blk. B-5 ..... Location.

Republic Prod. Co.'s No. 1-A Grisham-Hunter-B, SW cor. E half SE Sec. 41, Blk. B-5 ..... Top salt 1,340 ft.; top lime 2,135 ft.; standardizing 2,390 ft.

Republic Prod. Co.'s No. 3 Grisham-Hunter-B, NE cor. SE Sec. 41, Blk. B-5 ..... Drlg. 2,300 ft.

Republic Prod. Co.'s No. 4 Grisham-Hunter-B, NW cor. E half SE Sec. 41, Blk. B-5 ..... Location.

Republic Prod. Co.'s No. 2 Hendricks-A, NE E half SW Sec. 45, Blk. 26 ..... Top salt 1,240 ft.; top lime 2,135 ft.; fishing 2,302 ft.

Roxana Pet. Corp.'s No. 2 Grisham-Hunter-A, SE cor. E half NW Sec. 45, Blk. 26 ..... Top lime 2,351 ft.; to test oil show 2,742 ft.

Roxana Pet. Corp.'s No. 3 Grisham-Hunter-B ..... Shut down 2,740 ft.; 8,000,000 ft. gas.

Roxana Pet. Corp.'s No. 2 Grisham-Hunter-C, SE cor. N half NW Sec. 29, Blk. B-5 ..... Top salt 1,405 ft. showed oil 2,880-82 ft., 2,910-14 ft. and 2,919-36 ft.; top pay 2,948 ft.; total depth 2,989 ft.; flowed 320 bbls. per hr. open. 32 per cent water; pinched to 2,840 bbls., 2 per cent water; plugged back to 2,943 ft.; no production.

Roxana Pet. Corp.'s No. 6 Ida Hendricks-C, SW SE N half NW Sec. 29, Blk. B-5 ..... Location.

Roxana Pet. Corp.'s No. 7 Ida Hendrick-C, SE SW N half NW Sec. 29, Blk. B-5 ..... Location.

Roxana Pet. Corp.'s No. 3 Grisham-Hunter-D ..... Cem. 8¼-in. casing 2,237 ft.

Roxana Pet. Corp.'s No. 4 Grisham-Hunter-D, NE cor. S half NE Sec. 41, Blk. B-5 ..... Location.

Roxana Pet. Corp.'s No. 5 Grisham-Hunter-D, SE SW NE Sec. 41, Blk. B-5 ..... Location.

Roxana Pet. Corp.'s No. 6 Grisham-Hunter-D, SW SE NE Sec. 41, Blk. B-5 ..... Location.

Roxana Pet. Corp.'s No. 1 Grisham-Hunter-E ..... Shut down 600 ft.

Roxana Pet. Corp. and Llano Oil Co.'s No. 2 W. F. Scarborough, SW cor. NE Sec. 1, Blk. C-22, School Land ..... Drlg. 550 ft.; top salt 1,120 ft., drlg. 2,130 ft.

Sheldon & Burden's No. 1 Ida Hendricks, SW cor. SE Sec. 28, Blk. B-5 (10-a. tract) ..... Top salt 1,260 ft.; top lime 2,-609 ft.; top pay 2,719 ft.; small increase 2,914 ft. and 2,973 ft.; shot 30 qts. 3,049-54 ft.; second shot 2,888-2,914 ft.; third shot 100 qts. 2,759-85 ft.; hole bridged; cleaning out.

Southern C. O. P. Co.'s No. 2 Ida Hendricks T-88-B ..... Total depth 2,659 ft.; cem. 6-in. in lime; drlg. 2,830 ft.

Southern C. O. P. Co.'s No. 2 T-89 Grisham-Hunter-A, Sec. 35, Blk. B-5 ..... Standardizing 2,301 ft.; shut down.

Southern C. O. P. Co.'s No. 3 T-89-A Grisham-Hunter-A.. Shut down 2,352 ft.

Southern C. O. P. Co.'s No. 4 T-89-A Grisham-Hunter-A.. Location; rotary moved away.

Southern C. O. P. Co.'s No. 1 Ida Hendricks, 3-T-67-A, C SW NW NE Sec. 4, Blk. B-12, elev. 2,784 ft. ..... Top lime 2,638 ft.; slight show oil 3,000-08 ft.; filled up 1,500 ft. sulphur water at 3,065-72 ft.; plugged back to 3,050 ft.; water now shut off; shut down waiting orders.

Southern C. O. P. Co.'s No. 2 T-67-A, NE SE Sec. 42, Blk B-5 ..... Drlg. 811 ft.

Southern C. O. P. Co.'s No. 2 Ida Hendricks 3-T-67-A ... Total depth 2,805 ft.; straightening hole; drlg. 2,710 ft.

Southern C. O. P. Co.'s No. 1 Ida Hendrick, T-67-E, SE NE Sec. 42, Blk. B-5 ..... Drlg. 600 ft.

Southern C. O. P. Co.'s No. 2 T-67 Ida Hendricks-F ..... Top salt 1,715 ft.; cem. 6-in. 2,207 ft.; shut down 2,250 ft.

Southern C. O. P. Co.'s No. 3 T-67 Ida Hendricks-F ..... Top salt 1,702 ft.; top lime 2,688 ft.; drlg. 2,917 ft.

Southern C. O. P. Co.'s No. 4 T-67 Ida Hendricks-F ..... Top salt 1,800 ft.; top lime 2,700 ft.; drlg. 2,745 ft.

Southern C. O. P. Co.'s No. 5 T-67 Ida Hendricks-C ..... Cem. 6-in. 2,642 ft.; shut down.

Southern C. O. P. Co.'s No. 2 T-67 Hendricks-B ..... Top salt 1,866 ft.; setting 6-in. 2,658 ft.

Southern C. O. P. Co.'s No. 1 T-67 Hendricks-3-B ..... Cem. 8-in. casing 2,506 ft.

Southern C. O. P. Co.'s No. 2 T. G. Hendricks, T-67-3B, NE SW SW Sec. 35, Blk. 26 ..... Drlg. 1,800 ft.

Southern C. O. P. Co.'s No. 2 Hendricks 3-T-68-A ..... Top lime 2,280 ft.; 50,000,000 ft. gas; tools out; shut in 2,730 ft.

Southern C. O. P. Co.'s No. 3 Hendricks 3-T-68-A ..... First gas 2,400 ft.; 8,000,000 ft. gas 2,420 ft.; total depth 2,420 ft.; rigging to deepen.

Southern C. O. P. Co.'s No. 1 T-88 Ida Hendricks-C, NW cor. Sec. 28, Blk. B-5 ..... 6,000,000 ft. gas 2,665 ft.; top pay 2,883-96; 500 ft. oil.

Southern C. O. P. Co.'s No. 4 Ida Hendricks, T-88-C ..... Top salt 1,290 ft.; top lime 2,535 ft.; drlg. 2,874 ft.

Southern C. O. P. Co.'s No. 7 Ida Hendricks, T-88-C ..... Show gas 2,600 ft.; top pay 2,815 ft.; drlg. 2,985 ft.; spraying oil; total depth 3,051 ft.; initial prod. 350 bbls. in 15 hrs.

Southern C. O. P. Co.'s No. 1 Ida Hendricks, T-88-G, SW SE Sec. 28, Blk. B-5 ..... Top lime 2,612 ft.; rigging up standard tools 2,613 ft.

Southern C. O. P. Co.'s No. 1 T-88 Hendricks-H ..... Top salt 1,290 ft.; top lime 2,693 ft.; drlg. 2,857 ft.; showing.

Southern C. O. P. Co.'s No. 2 T-88 Hendricks-H ..... Top salt 1,232 ft.; total depth 2,700 ft.

Southern C. O. P. Co.'s No. 3 Ida Hendricks, T-88-H, SW NW SW Sec. 28, Blk. B-5 ..... Location.

Southern C. O. P. Co.'s No. 2 T-88 Hendricks-A ..... Cem. 6-in. 2,713 ft.

Southern C. O. P. Co.'s No. 1 Ida Hendricks, T-88-I, SE cor. E half NE Sec. 30, Blk. B-5 ..... Top lime 2,670 ft.; top salt 1,810 ft.; top pay 2,940 ft.; total depth 2,971 ft.; cleaning out; flowing 274 bbls. daily.

Southern C. O. P. Co.'s No. 1 T. G. Hendricks, T-88-K, NE cor. Sec. 41, Blk. 26 ..... Location.

Southern C. O. P. Co.'s No. 1 E. G. Hutchings, T-90, NE cor. E half SE Sec. 47, Blk. 26, elev. 2,825 ft. ..... Top salt 935 ft.; top lime 2,340 ft.; Drlg. 2,570 ft.

Texon O. & L. Co.'s No. 3 Grisham-Hunter-A ..... 5,000,000 ft. gas 2,260-2,500 ft.; 15,000,000 ft. gas 2,646-56 ft.; total depth 2,725 ft.; rig was wrecked when gas blew tools out of hole; est. 200,000,000 ft.; repairing rig; trying to fubricate 2,725 ft.

Texon O. & L. Co.'s No. 4 Grisham-Hunter-A, NE cor. W half SE Sec. 41, Blk. B-5 ..... Location.

Texon O. & L. Co.'s No. 3 Grisham-Hunter-A, NW cor. W half SE Sec. 41, Blk. B-5 ..... Top salt 1,150 ft.; fishing bit 2,539 ft.

Texon O. & L. Co.'s No. 1 Grisham-Hunter-B, NW cor. W half SW Sec. 45, School Blk. 26 ..... 1½ bailers salt water hr. at 2,725 ft.; top pay 2,863 ft.; drlg. 2,875 ft.; flowing 911 bbls.

Texon O. & L. Co.'s No. 2 Grisham-Hunter-B, NE W half SW Sec. 45, Blk. 26 ..... Top pay 2,810 ft.; drlg. 2,995 ft.; flowing 1,950 bbls.

Turman & Maxwell's No. 4 Ida Hendricks ..... Top lime 2,555 ft.; top pay 2,755 ft.; drlg. 2,890 ft.; making small heads.

Turman & Maxwell's No. 5 Hendricks, SE cor. E half NE Sec. 29, Blk. B-5 ..... Cem. 2,565 ft.

Turman & Maxwell's No. 6 Hendricks, NW cor. E half NE Sec. 29, Blk. B-5 ..... Rigging up standard tools 2,488 ft.; top salt 1,217 ft.

Turman & Maxwell's No. 8 Hendricks ..... Top salt 1,260 ft.; cem. 6-in. 2,355 ft.; drlg. 2,509 ft.

White Eagle O. & R. Co.'s (was Gibson & Johnson's) No. 1 P. A. Lock, 1,320 ft. W of NE cor. Sec. 30, Blk. 74, NW of discovery well, elev. 2,830 ft. ..... Total depth 3,260 ft.; shut down; pulled 5 3-16-in. casing to run 6⅝-in. casing by tools.

# STRAIGHT HOLES

## Through Inclined Strata

The ordinary string of tools being smaller than the hole, are easily sidetracked in drilling inclined strata, thus starting a crooked hole.

The JAQUES Forged Steel Drilling Connection fills the hole and guides the bit, but allows the mud to pass through the opening between the wings; thus not only correcting but PREVENTING CROOKED HOLES.

Note these features of the JAQUES Connection:

1—Prevents crooked holes.
2—Lessens jar breakage.
3—Cleans hole for bailer.
4—Allows more than one screw before running bailer.
5—Prevents cutting of the drilling cable.
6—Eliminates the possible cave-in.
7—Undue wall friction eliminated.
8—Reduces the whipping of drill cable.
9—Tools always in the center of the hole for fishing.
10—Gives the tools a rotary motion, preventing key-seating.

JAQUES Drilling Connections are made from the solid under 2,000-ton hydraulic forging press, and are guaranteed free from welds.

*Manufactured exclusively by*

TITUSVILLE FORGE COMPANY
Titusvile, Penn.

*Distributed by*
THE CONTINENTAL SUPPLY COMPANY
St. Louis, Mo.
THE CONTINENTAL WELL SUPPLY CO.
74 Trinity Court, New York

# JAQUES CONNECTIONS


## NEW DEVELOPMENTS IN USE OF AIR-GAS LIFT

(Continued from Page 81)

compression. The volume of natural gas is usually materially reduced, but this may not result when used during the earlier life of a well. One installation in northern Oklahoma is now lifting 400 bbls. from 3,000 feet with a working pressure of 45 pounds.

Automatic kickoff valves to reduce the starting pressure are available in several designs, most of them depending on a differential pressure between the inside and outside of the tubing for the operation of the valve. One design is operated by means of a wire from the valve to the surface and another by the velocity of the gas through an opening. There are several of these valves in use in the Garber, Oklahoma, Field and the Gulf Coast fields, but their general use is not common. In most areas the equipment is capable of withstanding the starting pressures required, and therefore there is no particular demand for these valves. Some trouble has occasionally been caused by running one of these and having it fail to operate properly, and one failure on a well of big potential production will make any operator hesitate to try again any piece of equipment for that purpose. While the use of automatic kickoff valves at the present time is not common, improved designs may be expected which will bring them into more general use, particularly where high starting pressures are required.

**Stage Lift**

Recent experiments have been conducted in lifting oil by means of a series of gas lifts within the well, the principle of which is identical with the stage lift which has been frequently applied to lift water from deep mines. The design for oil well pumping requires three strings of smaller pipe run inside of a larger size. At regular intervals a special coupling is installed, each of which is the beginning of another stage of the lift. Two of the small pipes are eduction pipes and the third a vent pipe for venting the gas spent in lifting the oil through the lower stages. In the operation, gas is introduced through the first coupling into one of the lift pipes, to raise the oil through the second coupling to the bottom of the third coupling where it is discharged, the oil falling back to the second coupling and the gas going up the vent pipe. More gas is introduced through the second coupling to lift the oil through the other lift pipe, through the third coupling to the bottom of the fourth coupling where it drops back to the third to be picked up again, the gas going into the vent pipe. This process is repeated until the oil reaches the surface, all of the stages working simultaneously.

The stage lift may be operated by the gas produced with the oil by holding sufficient pressure on the casing to operate the lift, or may be supplied by a compressor. The pressure required depends on the distance between the couplings. This is usually about 35 pounds when the couplings are placed some 65 feet apart, and proportionately greater for longer lifts. There is little to be gained by placing the couplings closer, as the additional volume of gas which must be vented imposes a higher pressure on the lower part of the vent pipe, which in turn requires a higher pressure to be maintained in the casing to operate the lift. In case extraneous gas from a compressor is to be used, the gas is introduced through one of the smaller pipes and the spent gas vented through the annular space between the tubing and casing. The volume of gas entering each stage of the lift is controlled by an orifice. Because of the small size of the pipes and numerous aerations in the process of the lift, paraffin is more troublesome than in other methods of pumping. On the whole, it is promising as an economic method of lifting where conditions are favorable for its operation.

Sentiment in favor of compressor plants for gas lift, gasoline extraction, repressuring and gas line boosting is gathering force, and the near future will probably bring a different operating policy for some of the present plants and new plants which will be built.

Most operators who are now lifting oil by means of air or gas lift are studying their individual operations closely, not only that the individual wells may be operated as cheaply as possible, but also to obtain data which will assist in establishing general principles governing the lifting of oil by this means. One of the most promising fields for the application of gas lift principles is in wells flowing naturally. Little has been done toward designing the size and arrangement of tubing in order to prolong the time that a well will flow by means of its own natural forces. The most common practice in the Mid-Continent area is to complete the wells with 6⅝-inch or 5 9/16-inch casing for the oil string. The well is permitted to flow through this as long as it will, then tubing is run either to obtain further natural flowing or for flowing with compressed air or gas. In many wells if the flow string were designed as carefully as the tubing in an air or gas lift installation, natural flowing life could be materially prolonged and lifting cost reduced.

The present tendency is toward operating wells with smaller production by means of air or gas lift. While for constant operation of pumping that method is more economical than most gas lift operations lifting the same amount of oil, the loss in production due to shutdown time and extra labor incident to frequent pulling of rods and tubing put the air-gas lift in strong competition with pumping in many wells because of its consistent operation. Improved methods of air-gas lift which are being made and will be made will bring this method in even stronger competition with plunger pumps, especially in the deeper wells. And the present trend of oil field development is decidedly toward deeper wells.

## STATE SUIT ON TITLE TO PANHANDLE LANDS

AUSTIN, Tex., Feb. 25.—Trial of the State's suit for title to about 7,000 acres of North Fork Red River bed oil land, some of which extends directly through the "Jackson Pool" in Gray and Wheeler Counties, probably will get under way in district court here during the March term. The action was filed by Assistant Attorney General C. W. Truehart against 192 defendants, many of which are among the major oil companies operating in Texas. District Judge Calhoun, after hearing the State's allegations, appointed A. S. Stiles, Austin, to make a survey of the holdings and report to him in the March court term. Truehart claims the tract is river bed land belonging to the State because the stream allegedly is navigable. He also seeks $100,000 cash damages.

## SURVEYING WEST TEXAS LINE

SAN ANTONIO, Tex., Feb. 27.—Surveyors for the Transcontinental Oil Co.'s proposed line from the Yates Pool in Pecos County to the ship channel at Houston are working in Kimble and Fayette Counties. The crew in Kimble County has surveyed the line to cross the Llano River immediately west of Johnson Creek and about 5 miles east of Junction. The crew surveying from the east have laid out the line in Fayette County to cross the Southern Pacific Railroad about 1 miles northwest of Ellinger in the eastern part of Fayette County and will pass within 2 miles south of La Grange, crossing the Colorado River between La Grange and Ellinger. In Kimble County, the line passes a half mile north of Junction.

## COMPLETES PIPE LINE

SAN ANTONIO, Tex., Feb. 27.—Golden West Oil Co. has completed the building of a pipe line from its leases in the Luling Field in Caldwell County to Sullivan, on the Southern Pacific Railroad, a few miles south, and is running its own oil.

## LEASING CONDITIONS IN CANADIAN WEST

CHATHAM, Ontario, Feb. 25.—In the western provinces of Canada, except British Columbia, the oil and gas rights are largely under control of the federal government at Ottawa. There are three general exceptions to this; lands homesteaded before 1889, where oil and gas rights are owned by the owner of the surface rights; lands of the Hudson's Bay Co., where the company controls oil and gas rights; and lands granted to the Canadian Pacific Railroad, where the railroad holds oil and gas rights.

Acreage on the great majority of oil structures can, however, be leased from the federal government, filings being made at the land office in the immediate district, and leases later issued from Ottawa. The outlay involved is a filing fee of $5 on each lease, plus an initial payment of 50 cents an acre. This payment covers lease rentals for a year from the date of issuance of the lease at Ottawa, which actually means in most cases 15 months from the date of filing.

Rentals for the second and succeeding years amount to $1 per acre, but companies or individuals engaged in actual development work can offset against these rentals certain sums spent in development. These include money spent for geological reports, and for shallow test holes, and money spent on drilling, exclusive of the cost of equipment. This policy is designed to encourage early exploration work. To qualify for such credits on rentals, companies must co-operate with the Geological Survey by furnishing samples of all formations penetrated by the drill, as well as detailed logs.

## LEGAL

**SALE OF OIL AND GAS LEASES DEPARTMENT OF THE INTERIOR**
**Shreveport, Louisiana**

Notice is hereby given that the followins described lands in eight units in the known geologic structure of the Monroe Gas Field, Louisiana, are offered for lease under Section 17 of the act of February 25, 1920 (41 Stat., 437), at the customary sliding scale of 12½ to 33⅓ per cent of the quantity or value of the oil produced, of 12½ to 16⅔ per cent of the value of the gas produced and of 16⅔ per cent of the value of the natural-gas gasoline produced from each unit in accordance with the royalty schedule in the regular lease form, and the rental as required by Section 17 of the said act:

**Unit No. 1.**
T. 18 N., R. 4 E., Sec. 24, Lot 3, 9.24 acres

**Unit No. 2.**
T. 19 N., R. 4 E., Sec. 8, NE¼ of NE¼, 40.00 acres.

**Unit No. 3.**
T. 19 N., R. 4 E., Sec. 30, Lots 1, 2, SE¼ NW¼, 106.70 acres.

**Unit No. 4.**
T. 19 N., R. 5 E., Sec. 10, SE¼ of SE¼, 39.22 acres.
T. 20 N., R. 5 E., Sec. 34, SE¼ of SE¼, 40.07 acres.

**Unit No. 5.**
T. 19 N., R. 5 E., Sec. 18, S½ of NW¼, Sec. 20, SW¼ of NW¼, Sec. 30, SW¼ of SE¼, 160.47 acres.

**Unit No. 6.**
T. 20 N., R. 3 E., Sec. 36, Lot 4, 15.80 acres.
T. 20 N., R. 4 E., Sec. 7, NW¼ of SW¼, 39.93 acres.

**Unit No. 7.**
T. 20 N., R. 4 E., Sec. 1, SE¼ of NW¼, Sec. 13, NW¼ of NE¼, 74.33 acres.

**Unit No. 8.**
T. 21 N., R. 5 E., Sec. 20, Lot 1; Sec. 29, NE¼ of SW¼; Sec. 33, Lots 2, 3, 4, 124.84 acres; all Louisiana Meridian, Louisiana, total, 651.26 acres.

The units are to be offered separately and are to be so considered as a basis for the payment of royalty, but any lessee may acquire two or more of the units in which the combined acreage does not exceed 640 acres.

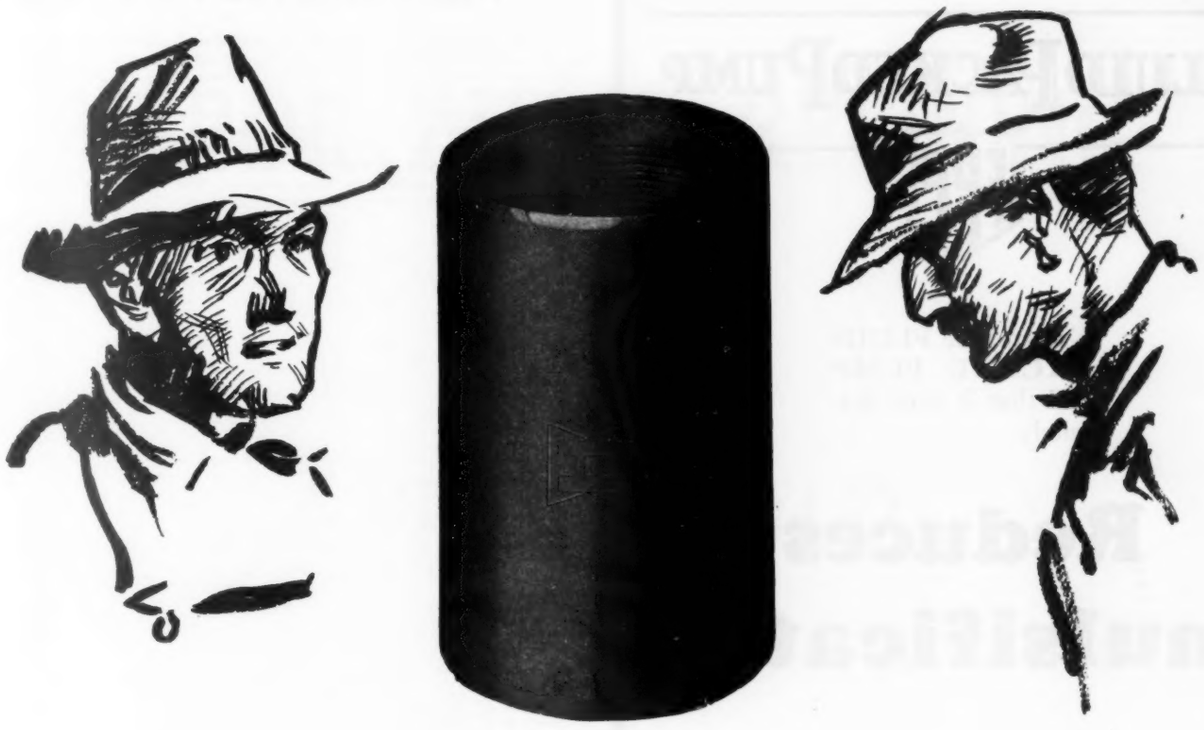
The lands are offered for lease subject to the drilling of offset wells by the lessee first on lands adjacent to tracts on which commercial production of gas has been demonstrated, such drilling operations to be initiated within ninety days after the delivery of the executed lease, each succeeding well thereafter as required to be drilled by the terms of the lease shall be spudded in within ninety days of the completion of the drilling well, all drilling operations to be in conformity with the laws of the State of Louisiana and to be continuously and diligently prosecuted in accordance with the Federal oil and gas regulations.

Said leases will be offered for sale by public auction at the Federal Court Room, Shreveport, Louisiana, at 10 a.m., on April 2, 1928. The successful bidder must deposit on the date of sale, with the officer in charge of the sale certified check on a solvent bank, or cash, for one-fifth of the amount bid by him, and file the showing of qualifications to receive a lease required by Sec. 15 of said regulations.

Bidders are warned against violations of the provisions of Sec. 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders.

The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior.

JAMES W. NEAL,
Officer in Charge.



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"I never knew the real meaning of coupling dependability, coupling uniformity and coupling economy until I began buying my couplings from a company that operates its own open hearth furnaces, rolling mills and forge shops.

***"Just try Harrisburg Forged Seamless Steel Couplings and see for yourself."***

"Harrisburg is the real pioneer when it comes to forged seamless steel couplings and I tell you—there's a big advantage in dealing with a firm that produces its own steel and controls every operation in the making of its finished products."

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# HARRISBURG

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FLUID PACKED PUMP

FPP

Users of the FLUID PACKED PUMP find that it very definitely

Reduces Emulsification

Mechanical emulsification in pumping wells results from fluid slippage caused by worn plungers and cups, damaged liners and leaky valves. Such fluid slippage does not occur in the FLUID PACKED PUMP because this modern pump has no cups, no packing, no close-fitting wearing parts.

FLUID PACKED PUMP users will tell you that there are no operating costs with the Fluid Packed barrel. Even your balls and seats will last longer in the FLUID PACKED PUMP. *Ask us why!*

Manufactured *only* by the Fluid Packed Pump Company, Los Neitos, Calif. Two types; Removable (which pulls with rods) and Rigid. Distributed in the Mid-Continent by Robert N. Atmore Company, Tulsa, Okla.

ROBERT N. ATMORE COMPANY

FLUID PACKED PUMPS

# TEXAS GROSS PRODUCTION GREATER, VALUE LESS FOR FOURTH QUARTER

Gross production of crude oil in Texas during the last quarter of 1927 registered an increase of 5,567,951.37 bbls. over the output during the third quarter of the year, according to reports filed with the state auditor at Austin for taxation purposes. The influence of West Texas production at 60 cents a barrel is shown in the decrease in the value of the crude produced during the fourth quarter, despite the greater output, the value of production of the fourth quarter being $50,242,479.19, as compared to $55,612,952.49 for the third quarter, a drop of $5,370,455.30. Production during the fourth quarter totaled 56,837,258.07 bbls., according to the reports, as compared to 51,269,306.7 bbls. during the third quarter. The report for the fourth quarter, as filed with the state auditor, follows:

A

| Name and address— | Barrels | Value |
|---|---|---|
| Ailes, J. W., Wichita Falls | 665.56 | 891.64 |
| Atlantic Oil Producing Co., Dallas | 1,956,282.30 | $1,288,346.31 |
| Ada Belle Oil Co., Batson | 22,654.00 | 27,839.69 |
| Anna Belle Oil Co., Dallas (9-30-27) | 4,616.58 | 6,463.21 |
| Amicable Life Insurance Co., Waco | 373.00 | 522.20 |
| Alamosa Oil Co., Amarillo | 85,461.83 | 59,991.53 |
| Agate Brothers, Eastland | 90.00 | 111.60 |
| Anna Belle Oil Co., Dallas | 4,418.11 | 6,185.35 |
| Abraham Earl, Bridgetown | 903.02 | 1,147.46 |
| Atkinson & Sandefer Oil Corp., Breckenridge | 13,586.25 | 17,645.96 |
| Alamo Oil Co., Brownwood | 555.00 | 710.00 |
| Apple-Brandeberry Oil Co., Wichita Falls | 11,750.56 | 16,027.74 |
| Abercrombie, J. S., Co., Houston | 116,063.07 | 137,424.02 |
| Anchor Oil Co., Dallas | 1,540.18 | 1,963.44 |
| Amarillo Oil Co., Amarillo | 2,068.79 | 1,561.59 |
| Adams, W. B., Burk urnett | 531.09 | 699.04 |
| American Well & Prospecting Co., Corsicana | 31,294.14 | 31,294.14 |
| Andrews, W. R., et al, Putnam | 1,733.42 | 2,241.17 |
| Acorn Oil Co., Beaumont | 8,244.17 | 9,893.00 |
| Apex Oil Corp., Amarillo | 726.73 | 545.05 |
| A. & P. Production Co., Houston | 152,670.69 | 189,653.30 |
| Alaska Petroleum Co., Amarillo | 1,558.30 | 1,168.72 |
| Atlantic Keystone Petroleum Co., New York, N. Y. | 1,672.18 | 1,672.18 |
| All-American Oil & Gas Co., Oklahoma City, Okla. | 39.99 | 51.95 |
| Andrews Petroleum Corp., New York, N. Y. | 5,875.94 | 6,363.00 |
| Arkansas Fuel Oil Co., Pittsburgh, Pa. | 7,241.90 | 9,440.88 |
| American Refining Co., Inc., by J. W. Hooser et al, receiver, Wichita Falls | 76,365.22 | 74,818.46 |
| Atlas Oil Corp., Humble | 3,711.00 | 4,453.00 |
| Ascot Co., Wichita Falls | 8,241.28 | 11,912.13 |
| Associated Oil Co., San Francisco, Calif. | 68,397.46 | 79,754.98 |
| Alonso, Jr., Oil Producers, Laredo | 1,756.22 | 1,756.22 |
| Artex Oil Co., Wichita Falls | 2,366.16 | 3,163.56 |
| Atlas Production Co., Burkburnett | 1,172.00 | 1,593.92 |
| Aarco Oil & Gas Co., Baltimore, Md. | 9,410.75 | 12,971.52 |
| Antilley, J. H., Sour Lake (3-31-27) | 3,309.60 | 4,633.40 |
| Antilley, J. H., Sour Lake (6-30-27) | 3,586.80 | 4,304.16 |
| Antilley, J. H., Sour Lake (9-30-27) | 4,406.47 | 5,287.76 |
| Antilley, J. H., Sour Lake | 4,567.52 | 5,481.02 |
| Albany Oil Co. and Hope Oil & Gas Co., Breckenridge | 4,660.35 | 6,029.94 |
| Amerada Petroleum Corp., Tulsa, Okla. | 179,189.53 | 193,548.85 |
| Arnold & Frazier, Putnam | 306.50 | 419.40 |
| Ashe Syndicate, The, Fort Worth | 688.05 | 894.46 |

B

| | | |
|---|---|---|
| Bryant, M. D., San Angelo | 7,038.21 | 4,222.93 |
| Buchanan, S. R., Batson | 8,302.66 | 9,963.19 |
| Beggs, George (Strip), Fort Worth | 3,127.68 | 5,028.60 |
| Bridwell Oil Co., Wichita Falls | 3,312.84 | 3,911.09 |
| Bridwell & Heydrick Oil Co., Wichita Falls | 86,980.06 | 116,574.83 |
| Bridwell & Heydrick, trustee, Wichita Falls | 4,562.43 | 6,296.45 |
| Bullington, Lee, Pendleton & Bullington, Wichita Falls | 8,951.33 | 12,014.42 |
| Big Lake Oil Co., Pittsburgh, Pa. | 1,517,868.60 | 1,664,630.65 |
| Boller, C. W., et al, Wichita Falls | 3,090.32 | 4,202.84 |
| Big State Oil Corp., Dallas | 263.03 | 341.93 |
| Black, W. A., Albany (9-30-27) | 596.74 | 728.02 |
| Burk Burnett, Jr., Oil Co., Fort Worth (6-30-27) | 445.23 | 514.25 |
| Burk Burnett, Jr., Oil Co. (9-30--27) | 359.93 | 411.56 |
| Buffalo Oil Co., Amarillo (9-30-27) | 7,551.04 | 6,162.29 |
| Briggs, R. F., et al, Corsicana (9-30-27) | 262.55 | 290.35 |
| Baird Oil Co., The, Moran | 429.36 | 576.16 |
| Bowman Oil Co., Rockdale | 1,870.15 | 2,501.13 |
| Baker, J. A., and Mollie E., Breckenridge | 9,543.00 | 12,596.00 |
| Bass & Dillard, Wichita Falls | 2,142.28 | 2,951.11 |
| Blue Bonnett Petroleum Corp., San Antonio | 1,240.10 | 1,476.82 |
| Bynum, W. W., Rockdale | 1,473.88 | 1,975.61 |
| Biel, William A., Von Ormy | 32.00 | 39.20 |
| Boller, C. W., Wichita Falls | 7,915.13 | 10,759.05 |
| British American Oil & Producing Co., Wichita Falls | 12,338.01 | 16,604.91 |
| Bailey, Fannie, Wichita Falls | 1,101.07 | 1,445.16 |
| Black Cat Oil Co., Electra | 1,336.10 | 1,763.65 |
| Britton, Gordan & Wickens, Strawn | 635.65 | 866.36 |
| Burton McKee Oil Corp., Strawn | 397.29 | 516.48 |
| Brinkley Producing & Refining Co., Pittsburgh, Pa. | 549.71 | 682.45 |
| Burns, L. T., Wichita Falls | 90,746.65 | 123,342.63 |
| Burns & Maxson, Wichita Falls | 5,271.00 | 6,999.44 |
| Bridwell & Mayfield, Wichita Falls | 12,021.54 | 16,730.59 |
| Biggs Oil & Gas Co., McKinney | 1,270.00 | 1,753.59 |
| Black Diamond Oil Co., Amarillo | 580.48 | 435.36 |
| Big Four Consolidated Oil Co., El Paso | 59.45 | 76.47 |
| Big Indian Oil & Development Co., Gainesville | 763.11 | 1,335.44 |
| Borealis Oil Co., Oklahoma City, Okla. | 3,650.41 | 4,886.71 |
| Broughton, S. J., Brownwood | 64.96 | 83.15 |
| Brown, Dr. E. W., estate, Orange | 4,659.85 | 5,591.81 |
| Brown, Mrs. Carrie, et al, Orange | 27,327.93 | 32,795.46 |
| Baldwin, F. C., et al, Fort Worth | 1,921.88 | 2,627.31 |
| Brady Brothers, Minerva | 2,906.31 | 3,685.34 |
| Breckenridge Gasoline Co., Toledo, Ohio | 85.38 | 107.61 |
| Bynum & Palmer, Rockdale | 242.27 | 312.53 |
| Barnsdall Oil Co., Tulsa, Okla. | 49,771.41 | 55,916.28 |
| Barbara Oil Co., Oklahoma City, Okla. | 8,926.50 | 12,637.74 |
| Babcock, Scheurer & Schaffke, Electra | 126.65 | 176.22 |
| Buttram Petroleum Corp., Oklahoma City, Okla. | 61,767.31 | 86,021.20 |
| Beaver Oil Corp., Oklahoma City, Okla. | 14,801.04 | 11,100.84 |
| Blair & Kell, Dallas | 871.17 | 1,103.11 |
| Badger Oil Co., Amarillo | 9,142.87 | 6,857.15 |
| Bartlett Production Co., Rockdale | 2,673.36 | 3,555.55 |
| Brooks & Hanlon, Inc., Tulsa Okla. | 1,064.34 | 1,361.18 |
| Beams, Drew, Okmulgee, Okla. | 716.78 | 946.13 |
| Black, W. A., Albany | 881.85 | 1,058.22 |
| Black-Pearson & Hudson, Corsicana | 4,995.91 | 4,995.91 |
| Bluebonnet Oil Co., Wichita Falls | 1,007.84 | 1,356.50 |
| Bonchil Co., The, Wichita Falls | 6,286.24 | 8,816.99 |
| Bonner, J. H. S., et al, Wichita Falls | 7,386.57 | 9,889.87 |
| Brazos River Gas Co., Wichita Falls | 329.95 | 460.26 |
| Bailey, Carl B., Wichita Falls | 2,204.10 | 2,985.55 |
| Barkley & Meadows, Wichita Falls | 98,101.86 | 129,155.70 |
| Bohner, C. J., Burkburnett | 5,958.26 | 8,175.58 |
| Bashara, J. F., Houston | 12,117.36 | 14,986.35 |
| Bashara, M. J., Oil Co., Wichita Falls | 2,183.84 | 2,511.41 |
| Bashara, M. J., & Sons, Wichita Falls | 9,641.59 | 11,745.73 |
| Brownwood Prod. & Refg. Co., Brownwood | 1,868.70 | 2,415.72 |
| Bleakley & Kinnison, Wichita Falls | 961.87 | 1,235.24 |
| Barnes, Jere B., Electra | 1,197.96 | 1,493.40 |
| Bashara & Bashara, Waco | 144.00 | 216.00 |
| Bluebonnet Oil Co., Wichita Falls (9-30-27) | 864.00 | 1,157.76 |
| Bryan Oil Corp., Houston | 1,217.63 | 1,229.81 |
| Barkley, T. G., Sour Lake | 1,595.00 | 1,914.00 |
| Bell Burke Oil Co., Waco | 462.76 | 572.66 |
| Bell Burke Oil Co., Waco (9-30-27) | 490.14 | 690.52 |
| Belva Oil Co., Eastland | 32,461.30 | 48,884.13 |
| Bevering, A. H., et al, Henrietta | 2,114.98 | 2,736.30 |
| Booth Oil Co., Olney | 215.00 | 280.50 |
| Brannon & Murray, Cisco | 1,860.00 | 2,470.30 |
| Broderick & Perrin, Fort Worth | 148.08 | 189.54 |

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# Down the Line!

In West Texas where digging conditions are far from ideal, this Shell pipe line is going in at the rate of 5000 feet per nine-hour day—according to the contractors, The Oklahoma Contracting Company of Dallas.

## Buckeye Pipe-Line Ditchers

Right down the line at the rate of a mile a day requires dependable ditcher construction. Buckeyes have for years been giving just such performance—in oil fields all over the world.

*Complete information sent for the asking.*

*A complete ditch at one cut.*

*"On its way" in West Texas.*

**THE BUCKEYE TRACTION DITCHER CO.**

**FINDLAY, OHIO**

*There's a Buckeye Sales and Service Office Near You*

*for over thirty years* **Buckeye**


| Name and address— | Barrels | Value |
|---|---|---|
| Bruce, H. J., Wichita Falls | 1,855.22 | 2,488.[illegible] |
| Bruce, H. J., Wichita Falls (9-30-27) | 1,905.87 | 2,573.[illegible] |
| Burkburnett Production Oil Trust, Baltimore, Md. | 771.20 | 1,056.[illegible] |
| Braden Co., The, Eastland | 2,411.02 | 3,532.[illegible] |
| Burke-Greis & Gwinnup, Tulsa, Okla. | 2,264.32 | 3,232.[illegible] |
| Burke-Greis Oil Co., Tulsa, Okla. | 2,261.19 | 3,113.[illegible] |
| Birk & Kelly, Iowa Park | 161.79 | 215.[illegible] |
| Brown & Co., Inc., Cisco | 1,665.47 | 2,232.[illegible] |
| Briggs, R. F., et al, Corsicana | 99.71 | 116.[illegible] |
| Bexata Oil Co., San Antonio | 1,864.97 | 2,241.[illegible] |
| Bush & Cluck, Waco | 350.00 | 350.[illegible] |
| Bartlett, William, & Co., Electra | 469.83 | 648.[illegible] |
| Bradstreet, L. G., Fort Worth | 22,825.71 | 31,040.[illegible] |
| C | | |
| Champlin Refining Co., J. T. Parks, Enid, Okla. | 122,378.93 | 76,286.[illegible] |
| Canady, Roy, Corsicana | 594.70 | 677.[illegible] |
| Carey, E. S., et al, Wichita Falls | 2,294.68 | 2,891.[illegible] |
| Carey, E. S., et al (Miller Drilling Co.), Wichita Falls | 1,054.80 | 1,356.[illegible] |
| Cowling & Hoppes, Burkburnett | 112.18 | 149.[illegible] |
| Cowling & Newell Oil Co., Burkburnett | 323.08 | 426.[illegible] |
| Clough, Charles E., Wichita Falls (9-30-27) | 956.25 | 1,290.[illegible] |
| Coyle-Concord Oil Co., San Antonio (9-30-27) | 2,090.94 | 2,653.[illegible] |
| California Co., The, Colorado | 879,599.00 | 649,224.[illegible] |
| Coons & Hotchkiss, Graham | 6,709.50 | 8,143.[illegible] |
| Crosbie, T. S. and G. K., Production Co., San Antonio | 1,641.57 | 1,969.[illegible] |
| Culbertson Brothers Co., Fort Worth (9-30-27) | 2,741.01 | 3,808.[illegible] |
| Culbertson Brothers Co., Fort Worth | 2,075.25 | 2,894.[illegible] |
| Corzelius Brothers & Taggert, Eastland (9-30-27) | 362.08 | 362.[illegible] |
| Caldwell, John W., Wichita Falls | 1,776.44 | 2,415.[illegible] |
| Cashdollar & Snyder, Brownwood | 326.51 | 351.[illegible] |
| Clara Oil Co., Wichita Falls | 673.58 | 877.[illegible] |
| Cushing Refining & Gasoline Co., Cushing, Okla. | 31,742.95 | 19,045.[illegible] |
| Cranfill Brothers Oil Co., Wichita Falls | 1,198.89 | 1,588.[illegible] |
| Canyon Oil & Gas Co., Cross Plains | 3,354.38 | 4,613.[illegible] |
| Cole, W. C., Wichita Falls | 3,663.01 | 4,953.[illegible] |
| Cady Oil Co. of Texas, Moran | 87.44 | 113.[illegible] |
| Carter, Roy I., Wichita Falls | 633.82 | 847.[illegible] |
| Church & Fields, Odessa | 21,462.29 | 12,877.[illegible] |
| Curry, E. M., Rising Star | 2,087.11 | 2,904.[illegible] |
| Canery, S. C., et al, Tulsa, Okla. | 642.74 | 753.[illegible] |
| Carteret Oil Co., Jersey City, N. J. | 728.08 | 976.[illegible] |
| Capitol Oil Co., Orange | 4,510.32 | 5,359.[illegible] |
| Cranfill Brothers Oil Co., Dallas | 5,764.34 | 8,039.[illegible] |
| Clarkson, William, Jr., (for Oil City Iron Works), Corsicana | 1,225.52 | 1,614.[illegible] |
| Cornhuskers Oil Co., Lincoln, Neb. | 3,296.88 | 3,296.[illegible] |
| Camp Oil & Gas Co., Wichita Falls | 3,024.21 | 4,021.[illegible] |
| Craig & Lowrie, Pittsburgh, Pa. | 2,806.51 | 3,351.[illegible] |
| Cox, Edwin B, Ardmore, Okla. | 2,525.81 | 3,356.[illegible] |
| Chapman, O. H., Waxahachie | 237.31 | 284.[illegible] |
| Clem Oil Co., Houston | 383.14 | 383.[illegible] |
| Church-Weekly-Fields et al, Odessa | 126,987.12 | [illegible] |
| Charter Oil Co., Brownwood | 27,123.67 | 34,866.[illegible] |
| Culbertson Co., Wichita Falls (9-30-27) | 16,057.27 | 22,140.[illegible] |
| Collier, J. W., and wife, Wichita Falls | 569.06 | 676.[illegible] |
| Cezeaux & Martin, Humble (9-30-27) | 7,727.00 | 9,272.[illegible] |
| Cezeaux & Martin, Humble (6-30-27) | 7,142.00 | 8,571.[illegible] |
| Cezeaux & Martin, Humble | 11,190.21 | 13,428.[illegible] |
| Coble-Whittenburg Oil Co., Amarillo | 10,213.99 | 7,660.[illegible] |
| Caruthers Co., San Antonio | 2,233.74 | 2,636.[illegible] |
| Chapman, P. A., Jr., Eastland | 670.83 | 871.[illegible] |
| Central Holding Co.-Jennings, Wichita Falls | 689.06 | 935.[illegible] |
| Cisco Oil Co., Tulsa, Okla. | 38,123.51 | 48,117.[illegible] |
| Clay, J. D., Houston | 2,768.30 | 3,271.[illegible] |
| Carlin & Tobin, Ranger | 290.80 | 430.[illegible] |
| Carlin, W. W., Ranger | 296.00 | 420.[illegible] |
| Cullen, H. R., et al, Houston | 173,368.63 | 213,172.[illegible] |
| Collins, J. L., & Co., Corsicana | 9,898.46 | 10,062.[illegible] |
| Center Field Oil Co., Amarillo | 438.97 | 329.[illegible] |
| Crosscut Corp., The, Fort Worth | 2,030.09 | 2,479.[illegible] |
| Curtis, James A., Wichita Falls | 3,108.27 | 4,228.[illegible] |
| Continental Oil Co. of Texas, Wichita Falls | 673,031.67 | 826,755.[illegible] |
| Cockrell-McIlroy Oil Co., Amarillo | 73,373.67 | 55,030.[illegible] |
| Chenault, Palmer & Burch, Wichita Falls | 19,774.43 | 26,993.[illegible] |
| Coffey & Schlaffke, Electra | 72.81 | 97.[illegible] |
| Crown Central Petroleum Corp., Houston | 79,930.56 | 79,930.[illegible] |
| Crown Oil & Refining Co., Houston | 15,154.81 | 18,185.[illegible] |
| Coyle-Concord Oil Co., San Antonio | 1,996.65 | 2,512.[illegible] |
| Chenault, W. L., Amarillo | 1,036.09 | 1,409.[illegible] |
| Culbertson Co., Wichita Falls | 14,661.33 | 20,211.[illegible] |
| Chestnut & Smith Corp., Tulsa, Okla. | 705.69 | 930.[illegible] |
| Carter, Fine & Carter, Wichita Falls | 3,127.00 | 3,826.[illegible] |
| Clark, R. R., Wichita Falls | 14,530.48 | 19,611.[illegible] |
| Cosden, J. S., Inc., Fort Worth | 12,272.68 | 15,979.[illegible] |
| Chapman, P. A., estate, Waxahachie | 19,328.05 | 24,948.[illegible] |
| Chapman Homer Oil Co., Dallas | 3,937.66 | 5,332.[illegible] |
| Conway Brothers & Gholson, Ranger | 265.65 | 478.[illegible] |
| Conway Brothers, Ranger | 334.99 | 447.[illegible] |
| Col-Tex Oil Co., Spokane, Wash. | 466.00 | 540.[illegible] |
| Clark, G. W., Wichita Falls | 232.81 | 306.[illegible] |
| Coffield & Hale, Wichita Falls | 4,330.58 | 5,500.[illegible] |
| Crenshaw, Albert, Wichita Falls | 4,764.31 | 6,352.[illegible] |
| Cline, W. D., et al, Wichita Falls | 517.60 | 689.[illegible] |
| Chicago Oil & Land Co., Rockdale | 2,816.45 | 3,561.[illegible] |
| Christie Brothers, Wichita Falls | 13,362.38 | 18,085.[illegible] |
| Clear Creek Oil Co., Brownwood | 302.64 | 379.[illegible] |
| Coffey & Graham, Wichita Falls | 399.50 | 543.[illegible] |
| Clear Lake Oil Co., Rockdale | 2,583.95 | 3,433.[illegible] |
| Columbia Petroleum Co., Inc., Mirando City | 20,094.36 | 20,094.[illegible] |
| Conner Sons & Cloughley, Gotebo, Okla. | 28,337.78 | 33,387.[illegible] |
| Continental Supply Co., St. Louis, Mo. | 568.30 | 726.[illegible] |
| Cook & Reeder et al, Wichita Falls | 5,832.94 | 8,112.[illegible] |
| Cook & Reeder, Wichita Falls | 407.68 | 540.[illegible] |
| Cranfill & Reynolds, Cisco | 512,375.84 | 372,656.[illegible] |
| Cohen & Lebow Trust, Baltimore, Md. | 156.71 | 205.[illegible] |
| Cohen, Aaron, Baltimore, Md. | 12,579.71 | 17,471.[illegible] |
| Crowe & Crowe, Iowa Park | 45.70 | 62.[illegible] |
| Consolidated Oil Co. of Texas, Wichita Falls | 25,948.58 | 33,828.[illegible] |
| Coppock & Coleman, Iowa Park | 3,490.00 | 4,711.[illegible] |
| Campbell & Wills, Burkburnett | 1,651.12 | 2,240.[illegible] |
| Cunningham Production Co., El Paso | 35,537.24 | 42,362.[illegible] |
| Corpus Christi Oil Co., Corpus Christi | 426.24 | 426.[illegible] |
| C. W. M. T. Oil Co., Wichita Falls | 2,194.07 | 2,973.[illegible] |
| Cook, R. H., Electra | 471.64 | 639.[illegible] |
| D | | |
| Davis, Caroline, Somerset | 415.13 | 483.[illegible] |
| Duho Oil Co., Houston | 466.67 | 700.[illegible] |
| Dismukes, H. A., receiver, Liberty | 6,611.87 | 7,934.[illegible] |
| Dale & Crawford, Electra | 1,016.72 | 1,374.[illegible] |
| Daniel, S. B., Wichita Falls | 1,366.67 | 1,858.[illegible] |
| Duffield Howard Oil Co., Tulsa, Okla. | 1,171.30 | 1,427.[illegible] |
| Dale Oil Corp., Wichita Falls | 24,956.87 | 33,791.[illegible] |
| Durston, H. H., Fort Worth | 1,285.91 | 1,464.[illegible] |
| Dutton & Rhome, Fort Worth (9-30-27) | 1,170.00 | 1,488.[illegible] |
| Dominion Oil Co., Tulsa, Okla. | 1,611.23 | 2,102.[illegible] |
| Dennis, J. S., Moran | 2,047.93 | 2,633.[illegible] |
| Dutton & Rhome, Fort Worth | 2,903.44 | 3,754.[illegible] |
| Duncan & Stratton, Cross Plains | 479.68 | 586.[illegible] |
| Developers Oil & Gas Co., Wichita Falls | 1,101.00 | 1,475.[illegible] |
| Derby Oil Co., Dallas | 499.50 | 644.[illegible] |
| Davis, W. F., Wichita Falls | 318.19 | 429.[illegible] |
| Dillon Glascock Co., San Antonio | 690.86 | 787.[illegible] |
| Douglas Production Co., Electra | 2,081.65 | 2,786.[illegible] |
| Douglas Brothers Oil Co., Electra | 550.35 | 748.[illegible] |
| Dale Oil & Refining Co., Wichita Falls | 1,342.82 | 1,796.[illegible] |
| Duke-Langford Oil Co., Wichita Falls | 772.62 | 772.[illegible] |
| Dale-Knotts Oil Co., Wichita Falls | 316.26 | 435.[illegible] |
| Deutser, B., trustee, Beaumont (9-30-27) | 1,463.03 | 1,755.[illegible] |
| Davis & Wallace, Cameron (9-30-27) | 1,457.34 | 1,850.[illegible] |
| Dudley, G. S., Iowa Park | 1,350.32 | 1,856.[illegible] |
| Dixon Creek Oil Co., Amarillo | 260,653.45 | 195,490.[illegible] |
| Double Five Oil Co., Amarillo | 2,091.91 | 1,569.[illegible] |
| Davis, L. R., Tulsa, Okla. | 185.06 | 191.[illegible] |
| Devonian Oil Co., Tulsa, Okla. | 42,317.72 | 31,738.[illegible] |
| Dixie Oil Co., Inc., Shreveport, La. | 167,760.18 | 101,109.[illegible] |
| Dunaway, J. E., et al, Wichita Falls | 1,324.32 | 1,787.[illegible] |
| Dull-Earls Texas Co., Allsany | 465.62 | 598.[illegible] |

# *The Best of Reputation in Every Oil Field*

# Heavy-Duty Trucks—and they live up to their name—INTERNATIONAL

YOUR drivers will appreciate the way Internationals dig into their work. The way they pull out of excavations, up hills and through heavy going. It goes without saying they will like the exclusive International design of the steering—the pitch of the steering wheel, as in an automobile.

For your part—you will appreciate the way the International qualities are demonstrated on the job and on the cost sheets. And your satisfaction will increase with mileage and years of hauling. Plenty of experience everywhere proves that they regularly deliver heavy-duty service at low cost.

International Heavy-Duty Trucks range from 2½ to 5 tons; chain or double-reduction drive; and they come with wheelbase and body best suited for the jobs they are to do.

Let us send you a folder on International low-cost hauling for the oil industry. Look over the trucks themselves at the nearest display room.

*In addition to the Heavy-Duty Trucks, the International line includes the Special Delivery for loads up to ¾-ton; 4 and 6-cylinder Speed Trucks of 1¼, 1½ and 2-ton sizes; Motor Coaches; and McCormick-Deering Industrial Tractors.*

INTERNATIONAL HARVESTER COMPANY
606 So. Michigan Ave. of America (Incorporated) Chicago, Ill.

## Here is what *Great Western Oil Co.* says about them

INTERNATIONAL HARVESTER CO.,
Cleveland, Ohio.

Gentlemen:

Our first Internationals were delivered in 1917 and are still working for us in Grand Rapids. Needless to say, we would have replaced them several years ago if it had not been for their economical operation.

The repairs have been so small, I wouldn't dare put them in this letter, because they would not represent normal truck experience.

We now have a number of your units of all sizes in operation and on a cost-per-mile basis, we don't believe there is anything better.

One feature that we like is your service in the different cities where we use Internationals.*

Yours is the only truck that we can afford to have serviced outside of our own shop.

Yours very truly,
THE GREAT WESTERN OIL CO.
K. G. BROWNE, Vice President.

*160 Harvester Branches serve International Trucks in the United States and Canada.

*International Harvester Trucks are popular wherever there is oil to be delivered. Above is part of the Waite Phillips fleet at Kansas City.*

# FOR HANDLING STILL VAPOR

## The simple and accessible design

## hours on the load for eith

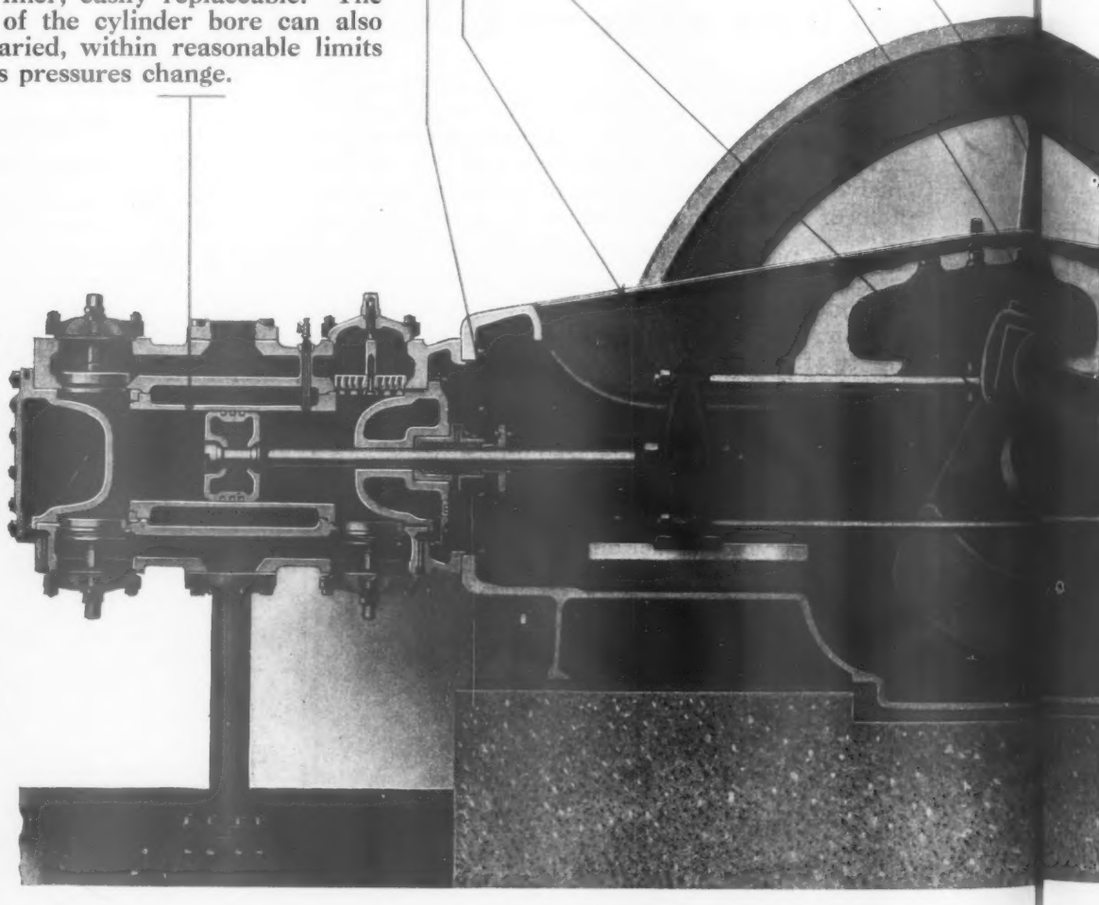
The oil guard can be lifted off as a whole, making all of the reciprocating parts readily accessible for repair or overhauling. (See photographs on last page.)

The compressor cylinder stuffing box can be adjusted, while the engine is running, through the oil guard door.

The compressor cylinder barrel is a liner, easily replaceable. The size of the cylinder bore can also be varied, within reasonable limits if gas pressures change.

The self aligning drag crank drives the lay shaft and valve gear.

The engine can be shut down and the main bearing, crosshead pin and crank pin taken up and the engine started again, all in 10 to 15 minutes time.



SECTION THROUGH COOPER TYPE-80 GAS ENGINE AND COMPRESSOR

BUILT AS SINGLE OR TWIN UNITS
85 to 190 B. H. P.

FOR COMPRESSOR, BELT OR ELECTRIC WORK

Cooper gas engines and compressors have been tested for handling still gases in some of the country's leading refineries and have been found entirely suitable for this special service. This plus the fact that operators invariably prefer them because they do show better operating records makes them desir-

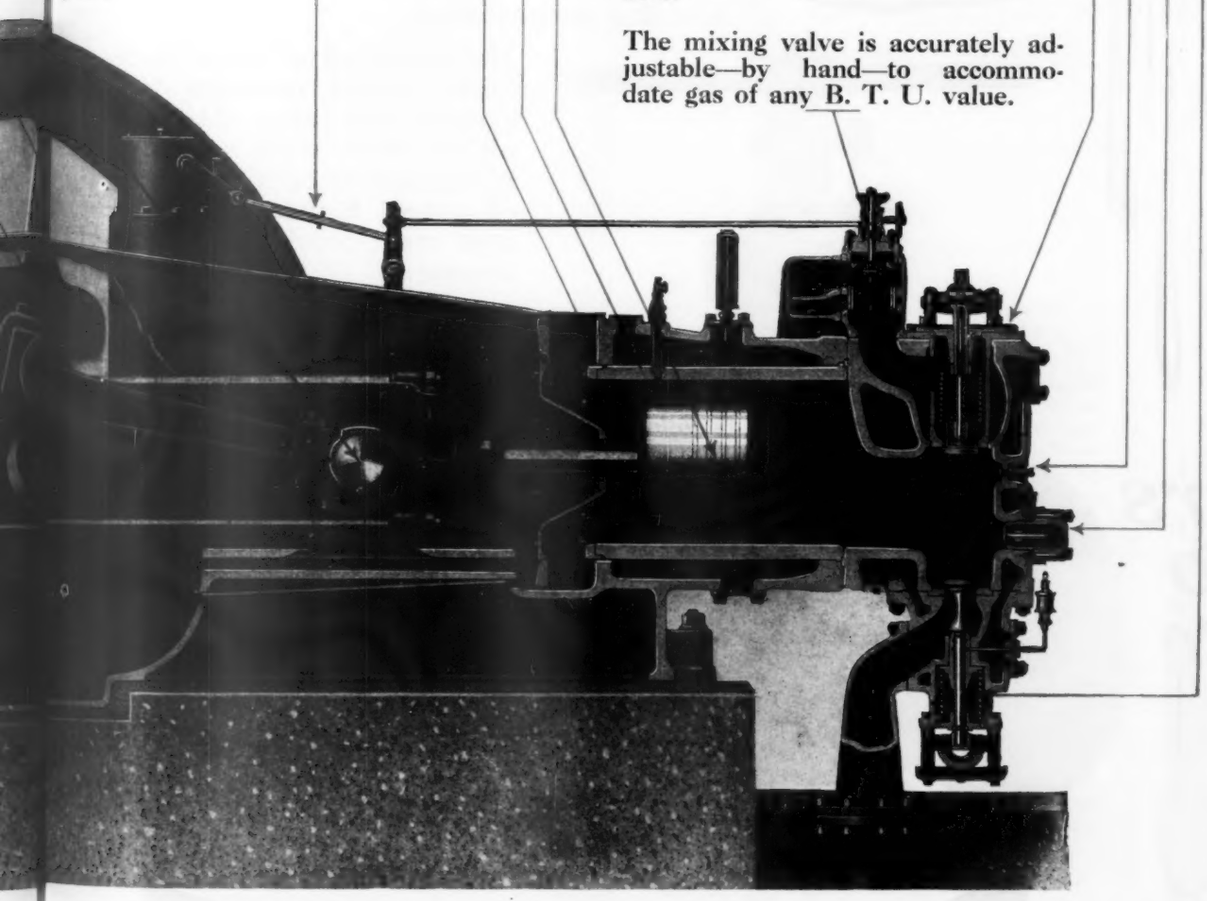
# The C. & G. Cooper Company

Magnolia Bldg., Dallas

649 S. Olive

# CHOOSE COOPER COMPRESSORS

## Cooper Type-80 engines means more efficiency in refinery or oil field service


The power piston can be removed through the bed and put back into the engine again, without disturbing the head or valve gear.
The power cylinder barrel is a liner which is easily replaceable.
Breather Compartment.
Speed changer (range 100 to 225 r. p. m.)
The exhaust chamber is a complete unit—including a removable exhaust valve seat, all easily removable.
Air Starting Check Valve.
Spark Plug.
The inlet valve is assembled in a complete cage—all easily removable.
The mixing valve is accurately adjustable—by hand—to accommodate gas of any B. T. U. value.

able for such installations. If you desire to compress gas for any purpose whatever, first find out how cheaply the job can be done with Cooper gas engine driven compressors. Standard sizes range from 50 to 1500 B. H. P. and are all of the simplified four-cycle type.

**Mount Vernon, Ohio**

Los Angeles

Kennedy Bldg., Tulsa

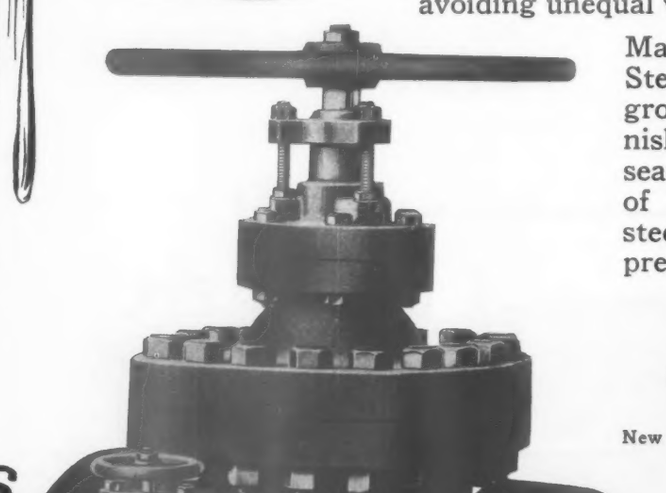
# When Oil Slips Through

WHAT'S the use of stopping leaks at the bung hole when the main spigot is open? Profits are oftentimes wasted in this drib drab fashion when a tight seating valve could be procured to halt the extravagance.

For the sake of economy "look into" the Darval Semi-Steel Gate Valve. A revelation is in store for you. You will find a perfectly balanced mechanism—as true and tight as a fine watch. The discs are independent of each other and independent of the wedges so they are free to revolve and change their positions on the seats each time the valve is closed, avoiding unequal wear.

Manufactured of Darval Semi-Steel, bronze mounted with ground seat faces. Also furnished with solid semi-steel seats made integral with body of valve. Either bronze or steel stem provided. For all pressures.

***Dollars Go To Waste***



**DARLING VALVE & MANUFACTURING CO.**
Williamsport, Pa.

New York Chicago Oklahoma City Houston

*Mid-Continent Distributors:*
Frick-Reid Supply Co. Atlas Supply Co.
International Supply Co. Petroleum Supply Co.

*California Distributor:*
Petroleum Equipment Company, Los Angeles

***Illustration of Darval Semi-Steel Gate Valve. Darling Forged Steel Valves also available for high pressure fields and other hazardous conditions.***

# DARLING
## GATE VALVES

| Name and address— | Barrels | Value |
|---|---|---|
| Dallas Petroleum Co., Dallas | 209.00 | 219.45 |
| Dean Oil Co., Burkburnett | 162.49 | 191.73 |
| Duquesne Oil Corp., Eastland | 272.31 | 401.59 |
| Dalton Jack Oil Co., Fort Worth | 2,069.98 | 2,782.26 |
| Dunigan Brothers, Amarillo | 3,417.09 | 2,562.81 |
| Derby & Haines, Wichita, Kans. | 16,021.32 | 12,015.99 |
| Derby, Haines & Williams, Wichita, Kans. | 19,401.20 | 14,550.90 |
| Delaney & Associates Oil Co., Inc., Pampa | 336,087.05 | 361,459.75 |
| Danciger Oil & Refining Co. of Texas, Fort Worth | 188,896.28 | 205,572.11 |
| Delmar Oil Co., Bartlesville, Okla. | 2,675.28 | 2,010.23 |
| Dibble Oil Co., San Antonio | 1,518.72 | 1,518.72 |
| Deutser, B., trustee, Beaumont | 1,172.92 | 1,407.48 |
| Dixon & Reeder, Wichita Falls | 242.17 | 271.22 |
| Dixon, Reeder & Cook, Wichita Falls | 1,269.03 | 1,717.98 |
| Deering, John A., Houston | 9,844.53 | 12,716.38 |
| Douglas Oil Co., Tulsa, Okla. | 2,674.52 | 2,005.89 |
| Den-Wich Oil Co., Abilene | 1,618.14 | 2,168.54 |
| Davis & Wallace, Cameron | 1,912.42 | 2,428.77 |
| Dorian, R. P., Wichita Falls | 7,233.70 | 7,449.71 |
| Dixie Drilling Co., Fort Worth | 560.86 | 764.86 |
| Deep Sands Syndicate, The, Corsicana | 477.00 | 477.00 |
| Diana Oil Co., Tulsa, Okla. | 1,780.21 | 2,379.16 |
| Diana Oil Co., Tulsa, Okla. | 1,128.63 | 1,518.75 |
| **E** | | |
| Eastland Oil Co., Fort Worth | 800,293.21 | 488,027.67 |
| Eastern Petroleum Corp., Wichita Falls | 1,779.22 | 3,321.46 |
| El Paso Burkburnett Oil Co., El Paso | 250.58 | 360.72 |
| East Batson Oil Co., Batson | 17,256.44 | 20,707.72 |
| Erickson, David, Wichita Falls | 60.57 | 81.55 |
| Empire Gas & Fuel Co., Bartlesville (6-30-27) | 153,844.27 | 146,213.59 |
| Electra Production Co., Inc., Electra | 1,054.11 | 1,415.71 |
| Empire Gas & Fuel Co., Bartlesville (9-30-27) | 103,858.22 | 90,003.53 |
| Empire Gas & Fuel Co., Bartlesville | 313,532.76 | 322,719.27 |
| Electra Gulf Oil Co., Electra | 4,505.26 | 5,315.43 |
| Eureka Producing Co., Tulsa, Okla. | 19,665.02 | 26,424.88 |
| Empire-Pierce Fordyce (lease), Fort Worth | 11,754.67 | 16,121.54 |
| Ellison Oil Co., Rockdale | 230.06 | 292.17 |
| Emrick, U. R., Chicago, Ill. | 348.92 | 434.83 |
| Echo Oil Co., Amarillo | 17,945.20 | 13,458.57 |
| Ellis & Lancaster, Beaumont | 848.66 | 1,056.99 |
| Eddleman, E. H., et al, Wichita Falls | 480.98 | 644.51 |
| Eddy Oil Co., Beaumont | 1,121.30 | 1,345.56 |
| Erie Investment, Ltd., of Texas, Toronto, Canada | 654.69 | 826.48 |
| Eggers, J. E., trustee, San Antonio | 846.67 | 997.18 |
| Engel, E. A., Albany | 699.79 | 911.34 |
| Eastern Petroleum Corp., Wichita Falls | 3,266.89 | 4,288.70 |
| Easton, E. S., Wichita Falls | 1,956.70 | 2,641.10 |
| Ellis & Anderson, San Antonio | 164.79 | 197.74 |
| Evangeline Petroleum Co., Wichita Falls | 2,417.06 | 2,417.06 |
| Electra Callahan Oil Co., Electra | 801.48 | 1,056.52 |
| Earnest Oil Co., Rockdale | 854.77 | 1,102.65 |
| **F** | | |
| Ferguson, Hawkins & Hester, Wichita Falls | 581.98 | 798.30 |
| Four Oil Co., Wichita Falls | 3,169.11 | 4,179.21 |
| Farlyn Oil Co., Houston | 26,945.59 | 27,166.29 |
| Farish & Ireland lease, Houston | 2,870.29 | 3,444.35 |
| Fogle Oil Co., Minerva | 1,925.00 | 2,295.88 |
| Frio Oil Co., San Antonio | 370.59 | 365.04 |
| Frontier Oil Co., San Antonio | 13,675.93 | 16,343.48 |
| Ferguson, W. R., Wichita Falls | 491.26 | 664.77 |
| Fleming & Kimbell, Sherman | 6,973.93 | 7,931.21 |
| F. E. E. Oil Co., Sherman | 17,771.23 | 18,901.34 |
| Franchot, D. W., & Co., Tulsa, Okla. | 63.67 | 78.95 |
| Fresno Oil Co., Wichita Falls | 16,035.31 | 22,128.71 |
| Foster & Sandford, Fort Worth | 365.21 | 425.66 |
| Fensland Oil Co. of Texas, Denver, Colo. | 7,395.54 | 9,680.52 |
| Flynn, W. B., Beaumont | 4,069.15 | 4,949.88 |
| Freeman-Hampton Oil Corp. ("A. & B."), Wichita Falls | 8,109.58 | 10,848.86 |
| Fain McGaha Oil Corp., Wichita Falls | 146,037.09 | 184,356.97 |
| Falls Production Co., Wichita Falls | 10,353.79 | 13,880.96 |
| Fuchs, Fritz, Taylor | 307.00 | 381.00 |
| Fort Ring Oil & Gas Co., Fort Worth | 222.26 | 337.31 |
| Fountain Production Co., Saratoga | 2,235.33 | 2,682.39 |
| Fuqua & Hipp, Grandfield, Okla. | 1,494.52 | 1,979.12 |
| Ferguson & Watson, Electra | 1,824.48 | 2,482.89 |
| Foster, Townsend and Ungren & Frazier, Putnam | 1,049.34 | 1,427.09 |
| Fresno Oil Co., Wichita Falls (9-30-27) | 19,261.89 | 26,581.41 |
| **G** | | |
| Gilbert & Rothschild, Carbon | 743.14 | 847.17 |
| Gopher Oil Co., Amarillo | 1,474.33 | 1,142.96 |
| Goulding, Phillips Oil Co., Amarillo (9-30-27) | 4,362.61 | 3,846.12 |
| Gohman Oil Co., Rockdale (9-30-27) | 302.63 | 382.64 |
| Green, W. J., et al, Wichita Falls | 111.84 | 145.41 |
| Gates-Bacon-Lea, Wichita Falls | 16,711.22 | 21,724.58 |
| Gaither Production Co., Rockdale | 1,666.30 | 2,147.92 |
| Graham & Lash, Moran | 313.48 | 420.04 |
| Godley Oil & Gas Co., Dallas | 24,219.38 | 26,770.59 |
| Glass Brothers, Rosebud | 848.35 | 1,072.72 |
| Ginter, George E., San Antonio | 119.63 | 149.53 |
| Ginter Lang Oil Co., San Antonio | 1,890.00 | 2,345.00 |
| Glenridge Oil Corp., St. Louis, Mo. | 4,418.87 | 5,836.54 |
| Gilliam Logan Oil Co., Fort Worth | 2,891.13 | 3,295.89 |
| Godfrey, F. L., Enid, Okla. | 117.38 | 155.00 |
| Gladis Oil Co., Saratoga | 2,679.17 | 2,679.17 |
| Golding Phillips Oil Co., Amarillo | 2,388.96 | 1,791.72 |
| Gordon Oil Co. of Texas, Logan, Ohio | 152.08 | 200.74 |
| Gunn Production Co., Cross Plains | 2,787.72 | 3,387.08 |
| Galves Oil Corp., Tulsa, Okla. | 4,759.40 | 6,282.41 |
| Granite Oil & Gas Co., Ridgeway, Colo. | 348.24 | 474.60 |
| Gulf Coast Oil Corp., Dallas | 15,876.12 | 19,051.35 |
| Grand Duke Producing Co., Muskogee, Okla. | 155.52 | 194.83 |
| Gray & Adams, Inc., Gainesville | 12,543.31 | 14,550.23 |
| Gray, T. H., Fort Worth | 810.86 | 931.37 |
| Grayce Oil Co., Wichita Falls | 21,036.38 | 28,747.58 |
| Gholson, John M., et al, Ranger | 8,606.05 | 11,421.62 |
| Goldenrod Oil Co., Dallas | 1,077.40 | 1,386.34 |
| Grady, D., Electra | 526.58 | 737.20 |
| Garrett, W. T., Eastland | 751.86 | 990.01 |
| Glasscock Leasing Synd., San Antonio | 1,940.30 | 2,357.60 |
| Gardner Brothers & Collins, Wichita Falls | 1,929.02 | 2,578.53 |
| Gulf Production Co., Houston | 5,849,323.11 | 5,233,698.24 |
| Group No. 1 Oil Corp., Big Lake | 461,636.01 | 503,021.90 |
| Golding & Cochran, Wichita Falls | 9,589.17 | 12,274.13 |
| Goldelline Oil Corp., Oklahoma City, Okla. | 14,801.04 | 11,100.84 |
| G. & K. Production Co., San Antonio | 1,568.02 | 1,887.15 |
| Guthrie, Cole & Ferguson, Wichita Falls | 1,048.31 | 1,362.80 |
| Gibson Oil Corp., Amarillo | 83,265.51 | 81,257.85 |
| Gates Oil Co., Ardmore, Okla. | 3,686.75 | 5,478.51 |
| Gallagher & Lawson, Desdemonia | 236.00 | 300.02 |
| Gladys Belle Oil Co., Tulsa, Okla. | 6,869.52 | 9,127.25 |
| Gilliland Oil Co., Tulsa, Okla. | 730.78 | 1,012.69 |
| Goolsbee & Goolsbee, Wichita Falls | 235.08 | 310.30 |
| Guaranty Oil Co., Electra | 118.44 | 162.70 |
| Gultex Production Co., Waxachachie | 3,293.68 | 4,545.27 |
| Gwyn-Boyd Drilling Co., Wichita Falls | 13,240.81 | 9,957.34 |
| Gwynn, P. F., agent, Wichita Falls | 1,918.20 | 2,571.54 |
| Gwynn, P. F., Wichita Falls | 121.36 | 149.32 |
| Gutzler, W. F., Wichita Falls | 383.84 | 521.16 |
| Harris & Simons, Tulsa, Okla. | 9,428.92 | 8,396.92 |
| Golconda Oil Co. No. 1, Wichita Falls | 179.38 | 227.80 |
| Gilman & Conway Brothers, Ranger | 8,319.13 | 11,765.26 |
| Gilliland, C. W., Wichita Falls | 2,651.61 | 3,612.93 |
| Goolsbee & Graham, Wichita Falls | 59.44 | 77.77 |
| Graham, H. L., Wichita Falls | 1,260.91 | 1,616.23 |
| Grayburg Oil Co., San Antonio | 206,798.50 | 210,749.08 |
| Gates Oil Co. (Wyoming Corp.), Denver, Colo. | 12,618.18 | 9,463.64 |
| Gilman, R. F., Cisco | 245.18 | 326.89 |
| Gilman & McMurray, Cisco | 306.22 | 421.10 |
| Golden West Oil Co., San Antonio | 26,090.08 | 27,950.09 |
| Gholson, Norman & Dorsey et al, Ranger | 2,772.65 | 3,775.06 |
| Goldhill Oil Co., Iowa Park | 1,786.29 | 2,293.62 |
| Gordon, H. B., Houston | 3,188.65 | 4,432.21 |
| Gordon, Folwell, Dickson, Inc., Houston | 37,275.91 | 43,458.17 |
| Gilbert Co., Beaumont | 5,555.26 | 6,666.63 |
| Gainesville Oil & Development Co., Gainesville | 6,794.91 | 7,882.09 |
| Glasscock, Rosa V., San Antonio | 900.94 | 1,079.28 |


# ECLIPSE DEEPWELL PULLING MACHINE

***Produce every barrel of oil in the most economical way***

***The***

## Eclipse Deepwell Pulling Machine

***makes unnecessary a derrick for every well. One machine and tractor will handle as many as twenty wells.***

***Specifications***

**DEEPWELL**

**Eclipse Deepwell up to 8000 ft. 2" Tubing, Weight .....3645**

**Mast 8x10x36 ft., Douglass Fir A-Style Two Wheel Truck, two 16" Bronze bearing crown pulleys, 2⅛ Steel Pin mounted in malleable boxings. Large supporting plate 16" dia. between crown pulleys, eliminating any chance of bending pin.**

**Reel or Drum; 32 lb. 8¼ casing filled with concrete for winding drum, differentials banded with 3/16 band iron, brake surface 6"x40", choke brake style same as Star drilling machine.**

**The whole reel assembly is mounted on 2¾ square steel shaft extending clear through reel, secured by three heavy castings.**

***For Sale By All Supply Companies***

*Manufactured By—*

SAFETY PULLING MACHINE CO.

INDEPENDENCE, KANSAS

# New Larger Rig Lighter

**WESTINGHOUSE announces a new 3 kw. rig lighter that will provide for the greater demand for current required by rotary rigs.**

**It is a companion to the famous 1½ kw. Westinghouse rig lighter that has put well drilling on a 24 hour basis and many of the parts are interchangeable.**

**Consult your nearest supply store or our district office.**

**Westinghouse Electric & Manufacturing Company**
**South Philadelphia Works Philadelphia, Pa.**
**Sales Offices in All Principal Cities of the United States and Foreign Countries**

**Westinghouse**

X96565

Rig Lighter


| Name and address— | Barrels | Value |
|---|---|---|
| **H** | | |
| Hamilton, Walter R., San Antonio | 5,636.01 | 7,285.[illegible] |
| Hamilton & Martin, Wichita Falls | 1,362.80 | 1,812.[illegible] |
| Hambleton, George, San Antonio | 504.88 | 614.[illegible] |
| Hoppes, W. T., Burkburnett | 52.36 | 70.[illegible] |
| Hobbs, Henry (formerly The Tulsa Co.), Wichita Falls | 655.90 | 865.[illegible] |
| Hester, Hawkins & Ferguson, trustees, Wichita Falls | 654.61 | 864.[illegible] |
| Holloway, R. R., receiver, Brownwood | 926.24 | 1,258.[illegible] |
| Horn & Horn, trustees, Kansas City, Mo. | 4,950.03 | 4,046.[illegible] |
| Hutchinson County Oil Co., Amarillo | 300.00 | 195.[illegible] |
| Hickey, T. J., et al, Corsicana | 71.24 | 94.[illegible] |
| Hamilton, Robert, et al, Eastland | 322.00 | 418.[illegible] |
| Houston Oil Co. of Texas, Houston | 8,920.48 | 11,642.[illegible] |
| Helf, C. H., Albany | 751.08 | 956.[illegible] |
| Hueco Ranger Oil Co., El Paso | 670.53 | 893.[illegible] |
| Hope Oil & Gas Co., Fort Worth | 18,857.55 | 24,702.[illegible] |
| Howard Petroleum Corp., Tulsa, Okla. | 989.20 | 1,211.[illegible] |
| Houseman, D. H., & Co., Dallas | 57.28 | 75.[illegible] |
| Hill, W. M., Putnam | 19,944.71 | 28,472.[illegible] |
| Hill & Dowell, Baton | 2,985.12 | 3,582.[illegible] |
| Howard, Duffield & Berlin, Tulsa, Okla. | 1,527.78 | 1,635.[illegible] |
| Herogan Oil Co., Amarillo | 3,522.80 | 2,642.[illegible] |
| Hobson & Voorhees, San Antonio | 775.67 | 1,112.[illegible] |
| Handrick, Aug., Moran | 255.82 | 309.[illegible] |
| Hedrick-Camp Drilling Co., Wichita Falls | 10,783.45 | 12,619.[illegible] |
| Hill, W. R., trustee, Burkburnett | 242.66 | 334.[illegible] |
| Hardy Oil Co., Wichita Falls | 2,874.78 | 3,852.[illegible] |
| Hemby, J. M., Electra | 815.93 | 1,104.[illegible] |
| Hitchman & Howard, San Antonio | 1,653.42 | 2,037.[illegible] |
| Hinson & Tidwell, Graham | 4,390.14 | 5,776.[illegible] |
| Humble Oil & Refining Co., Houston | 2,963,199.89 | 3,044,788.[illegible] |
| Harvey, R. A., Houston | 1,847.00 | 2,136.[illegible] |
| Hobbs Oil Co., Tulsa, Okla. | 2,958.42 | 3,973.[illegible] |
| Hagaman Refining Corp., Ranger | 711.42 | 921.[illegible] |
| Halmack Oil Co., Dallas | 2,331.86 | 3,099.[illegible] |
| Humphreys Brothers, Inc., Brownwood | 483.16 | 658.[illegible] |
| Herbert Oil Co. of Texas, Fort Worth | 922.99 | 1,272.[illegible] |
| Hankamer, Earl C., & Co., Sour Lake | 657.58 | 788.[illegible] |
| Hickok Producing & Development Co., Toledo, Ohio | 462.29 | 500.[illegible] |
| Houghland Production Co., Dallas | 5,149.31 | 6,416.[illegible] |
| Horn, T. W., Houston | 1,088.79 | 1,306.[illegible] |
| H-Y Oil Co., Inc., Fort Worth | 2,819.89 | 3,865.[illegible] |
| Holmes & Huey, Amarillo | 4,649.16 | 3,486.[illegible] |
| Humphreys Corp., Houston | 66,983.97 | 83,891.[illegible] |
| Hardie, J. M., & Co., Sour Lake | 497.91 | 597.[illegible] |
| Hughes, Wm. K., trustee, St. Louis, Mo. | 1,217.69 | 1,586.[illegible] |
| Harris & Bryan, Eastland | 220.00 | 314.[illegible] |
| Hyde & James, Albany | 9,260.44 | 12,415.[illegible] |
| Huber, J. M., Co. of Louisiana, Breckenridge | 502.76 | 692.[illegible] |
| Hanlon Gasoline Co., Tulsa, Okla. | 1,377.15 | 1,744.[illegible] |
| Home Oil & Gas Co., Inc., Albany | 3,244.18 | 4,153.[illegible] |
| Helvetia Oil Co., San Antonio | 15,077.59 | 17,853.[illegible] |
| House Lewis Oil Co., Cameron | 839.67 | 1,057.[illegible] |
| Hull Oil Co., Beaumont | 13,461.36 | 16,035.[illegible] |
| Howell, M. L., Lohn | 657.00 | 854.[illegible] |
| Hockaday & Shaw, Wichita Falls | 1,408.62 | 1,871.[illegible] |
| Hefley, McIntosh & Thomas, Cameron | 666.13 | 834.[illegible] |
| Homaska Oil Co., Oklahoma City, Okla. | 4,823.67 | 6,814.[illegible] |
| Hammond, L. P., Wichita Falls | 2,748.14 | 3,794.[illegible] |
| Holman Brothers & Leidecker, Graham | 9,961.80 | 13,920.[illegible] |
| Hooser, John W., *Hooser Oil & Development Co., Dallas | 20,154.36 | 27,537.[illegible] |
| Houston Production Co., Houston | 14,977.10 | 17,667.[illegible] |
| Hammon, Wayne H., special agent, Wichita Falls | 1,256.84 | 1,632.[illegible] |
| Hammon & Garrett, Wichita Falls | 4,907.94 | 6,731.[illegible] |
| Hammon, Heyser & Garrett, Wichita Falls | 1,542.44 | 2,094.[illegible] |
| Hammon & Heyser, Wichita Falls | 418.02 | 565.[illegible] |
| Hammon, Heyser & Garrett, special account, Wichita Falls | 14,860.70 | 18,180.[illegible] |
| Hammon, Heyser, Garrett & King, Wichita Falls | 3,044.93 | 4,396.[illegible] |
| Harrison Oil Co., Houston | 18,483.84 | 26,431.[illegible] |
| Harris & Hayes Co., Okmulgee, Okla. | 603.32 | 748.[illegible] |
| Holbrook & Woods, Wichita Falls | 9,719.29 | 13,026.[illegible] |
| Hines, Harry, Wichita Falls | 324.01 | 421.[illegible] |
| Hughes, K., Oil Co., Mexia | 36,650.17 | 50,472.[illegible] |
| Hughes, J. K., Development Co., Mexia | 131,502.18 | 137,581.[illegible] |
| Hutton Oil Corp., Cisco | 1,830.90 | 2,177.[illegible] |
| H. B. J. Oil & Gas Trust, Baltimore, Md. | 2,245.30 | 3,201.[illegible] |
| Harris Fisher Oil Co., Cisco | 481.34 | 638.[illegible] |
| Harwell Brothers, Abilene | 906.22 | 1,211.[illegible] |
| Harwell, O. H. & O. E., Abilene | 644.80 | 872.[illegible] |
| Hamon, Jake L., Jr., Ardmore, Okla. | 9,949.64 | 13,018.[illegible] |
| Hill & Riley, Amarillo | 966.63 | 734.[illegible] |
| Holmes & Riley, Amarillo | 11,183.14 | 8,387.[illegible] |
| Hyde, George, Houston | 2,204.88 | 2,645.[illegible] |
| Hyde Production Co., Houston | 5,704.62 | 6,845.[illegible] |
| Hart-Mexia Syndicate, Fort Worth | 196.89 | 259.[illegible] |
| Hoffer Oil Corp., Fort Worth | 5,902.36 | 6,709.[illegible] |
| Hagy Co., The, Amarillo, (9-30-27) | 196.00 | 201.[illegible] |
| Houston Gulf Gas Co., Houston | 10,141.94 | 10,141.[illegible] |
| Hamilton & Martin, Wichita Falls | 2,113.80 | 2,705.[illegible] |
| Hooser, John W., et al, receivers for— | | |
| N. B. Chenault, Wichita Falls | 2,414.44 | 3,263.[illegible] |
| Bashara, M. J., Wichita Falls | 7,892.12 | 8,872.[illegible] |
| Waggoner, R. M., Wichita Falls | 2,889.92 | 3,930.[illegible] |
| Priddy, W. M., Wichita Falls | 9,962.85 | 12,951.[illegible] |
| **I** | | |
| Isaacs, B. K., Fort Worth (7-1 to 12-31) | 1,418.72 | 1,731.[illegible] |
| Idaho Oil Co., San Antonio | 1,255.58 | 1,526.[illegible] |
| Infield Petroleum Co., Austin | 936.26 | 1,260.[illegible] |
| Ilseng Production Co., Fort Worth | 2,174.63 | 2,815.[illegible] |
| Ilseng, A. G., Fort Worth | 200.12 | 278.[illegible] |
| Interocean Oil Co., Tulsa, Okla. | 16,561.91 | 21,790.[illegible] |
| Independent Oil & Gas Co., Tulsa, Okla. | 295,266.00 | 180,356.[illegible] |
| Irick Oil Co., Waskom | 384.29 | 491.[illegible] |
| **J** | | |
| Jackson, T. H., Sipe Springs | 200.88 | 256.[illegible] |
| Johnson Brothers, San Antonio | 9,695.57 | 12,052.[illegible] |
| Jones, J. A., Moran | 501.68 | 688.[illegible] |
| Judson Oil Co., Tulsa, Okla. | 11,212.03 | 15,196.[illegible] |
| Julia Oil Co., Sour Lake | 3,962.75 | 4,755.[illegible] |
| Japhet Production Co., Houston | 18,873.20 | 14,154.[illegible] |
| Jones, W. A., Thomas Phillips lease, Minerva | 229.17 | 294.[illegible] |
| Janelien Oil Co., Tulsa, Okla. | 160.00 | 208.[illegible] |
| Jackson, J. S., trustee, Sour Lake | 2,604.39 | 3,125.[illegible] |
| Jacob Oil & Gas Co., Graham | 579.96 | 777.[illegible] |
| Jones, Edwin M., El Dorado, Ark. | 20,020.92 | 26,044.[illegible] |
| Jones, J. E., Wichita Falls | 1,395.64 | 1,897.[illegible] |
| Justin Oil Corp., et al, Wichita Falls | 13,005.76 | 17,908.[illegible] |
| Jennings, J. C., et al, Wichita Falls | 576.00 | 801.[illegible] |
| Jonray Oil Co., San Antonio | 3,737.28 | 4,463.[illegible] |
| Junior Oil Co., Cross Plains | 2,167.35 | 3,145.[illegible] |
| Jackson Co., The, San Antonio | 1,481.93 | 1,800.[illegible] |
| **K** | | |
| K. & S. Corp., Laredo | 19,716.67 | 19,716.[illegible] |
| Kokomo Petroleum Co., Gorman (9-30-27) | 1,783.00 | 2,465.[illegible] |
| Knotts, F. L., Wichita Falls (9-30-27) | 568.94 | 773.[illegible] |
| Kent, G. C., Corsicana | 37,105.47 | 47,554.[illegible] |
| Kent-Middleton Refining Co., Corsicana | 20,594.15 | 26,460.[illegible] |
| Klainfelder, B. F., Breckenridge | 609.24 | 801.[illegible] |
| Kurz Oil Co., Somerset | 575.77 | 667.[illegible] |
| Kuhlemeier-Kliner, Cisco | 1,433.74 | 1,921.[illegible] |
| Kurz, A. A., San Antonio | 884.32 | 483.[illegible] |
| King, Anna B., Muskogee, Okla. | 2,657.77 | 1,594.[illegible] |
| Kershaw, L. R., Muskogee, Okla. | 2,657.77 | 1,594.[illegible] |
| Kerr, F. P., Corsicana | 507.13 | 660.[illegible] |
| Kolp, C. F., Electra | 12,079.09 | 15,920.[illegible] |
| Klemcke, George, trustee, Van Ormy | 2,256.39 | 2,622.[illegible] |
| Kahle, Gracey and Diver, Bridgeport, Ill. | 9,597.86 | 9,513.[illegible] |
| Kimmell and Dillard, Wichita Falls | 4,237.97 | 5,602.[illegible] |
| Kilgore, M. H., Beaumont | 234.34 | 293.[illegible] |
| Kate Bell Oil Co., The, Dallas | 1,403.03 | 1,815.[illegible] |
| Kenbrow Co., Wooster, Ohio | 18,685.00 | 25,701.[illegible] |
| Keen & Woolf Oil Co., Shreveport, La. | 24,860.60 | 29,832.[illegible] |
| Kokomo Petroleum Co., Gorman | 1,470.00 | 1,990.[illegible] |
| Kavanaugh Petroleum Co., Houston | 844.57 | 1,097.[illegible] |
| Keystone Production Co. of Texas, The, Fort Worth | 5,069.41 | 6,913.[illegible] |
| Koenig, Max W., San Antonio | 13,369.72 | 13,369.[illegible] |
| Kishi, K., Terry | 1,353.45 | 1,624.[illegible] |
| Kone Production Co., San Antonio | 22,216.58 | 31,941.[illegible] |
| Kendricks, P. S., Albany | 948.23 | 1,123.[illegible] |
| Kirby Petroleum Co., Houston | 34,683.95 | 23,928.[illegible] |
| Kewanee Oil & Gas Co., Titusville, Pa. | 131,454.39 | 131,454.[illegible] |

# BANROC

## No. 65 Metal Covered Pipe Insulation

ORIGINATORS OF ROCK WOOL PRODUCTS

Especially designed for use in the refinery where a highly efficient, fireproof, waterproof removable insulation is required—

# INSULATION

MADE of the famous Banroc Wool, felted into segmental forms for flexibility and ease of application, and fastened by means of a special flange and seam joint to a 24 gauge ingot iron outer casing. Applied by simply slipping around the pipe and bolting on. Can be removed at any time, and replaced without loss.

For complete information about this new patented type pipe insulation, send the coupon below.

### Banroc Insulating Cements

Banroc Wool has been compounded into a line of insulating cements that are admirably suited for the various purposes intended. Outstanding among these is Banroc High Temperature Waterproofing, developed especially for waterproofing refinery equipment.

It consists of a special Banroc Cement to which is added Banroc Waterproofing compound. When applied, it is waterproof, and remains so. Will not crack or peel off. It is also fireproof, thus eliminating possibility of flash fires.

BANNER ROCK PRODUCTS CO.
Alexandria, Indiana.

Please send me complete information about - - -

( ) Banroc No. 65 Pipe Insulation
( ) Banroc Insulating Cements
( ) Banroc High Temperature Waterproofing.

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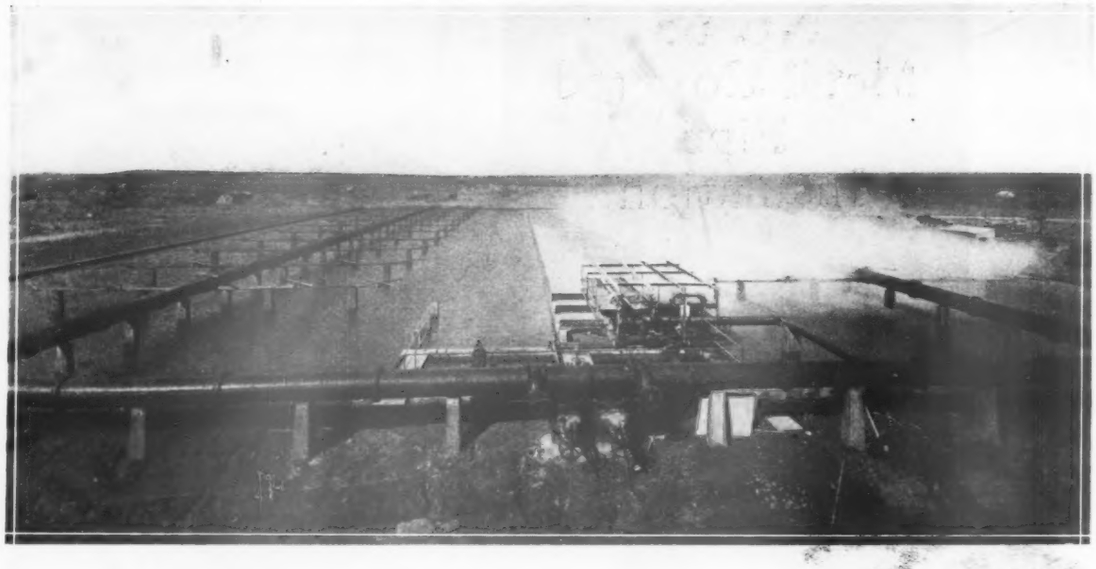
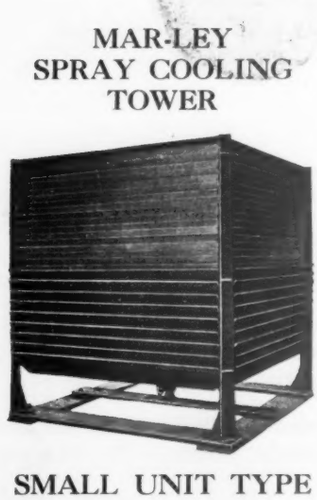
# MAR-LEY SPRAY PONDS



## —SERVING THE "PECOS" FIELD

MAR-LEY
SPRAY COOLING
TOWER



SMALL UNIT TYPE

The Marley small unit type spray cooling tower is for use where the demand for cooling is under 100 G.P.M. Simple, compact, easy to install, durable. Will do its duty dependably. Circular on request.

'TIS not surprising that a Marley Spray Pond was provided to furnish cooling service to the Pecos Valley Light and Power Company—to assist them to supply the light and power needs for the Yates, Crane and McCamey fields. For, Marley Spray Ponds are most always called upon to perform this duty where economical and dependable operation is required. The above installation consists of 2 units—with an individual capacity of 12,000 G.P.M. or a combined capacity for the entire pond of 24,000 G.P.M.

## MAR-LEY
## SPRAY COOLING EQUIPMENT

Marley Spray Ponds and Spray Cooling Equipment have earned a well deserved reputation in the oil industry for economical and dependable operation. Quite a large number are now in use throughout the Mid-Continent fields. A complete cooling service in design and equipment is offered by "Marley"—with *guaranteed results.* We will be glad to cite you to any number of installations for evidence of the operating satisfaction of Marley Spray Ponds.

INQUIRIES SOLICITED
Prompt Service Assured
WRITE!

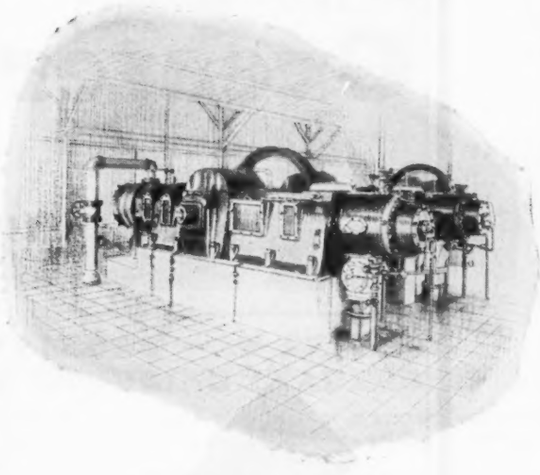
MARLEY PPE PRODUCTS

POWER PLANT EQUIPMENT CO.
COCA COLA BLDG.
KANSAS CITY, MO.

| Name and address— | Barrels | Value |
|---|---|---|
| King and Daniel, Wichita Falls | 4,468.00 | 6,152.48 |
| King Royalty Co., Wichita Falls | 22,367.05 | 30,551.10 |
| Killam, O. W., Laredo | 1,567.09 | 1,567.09 |
| Killam, O. W., et al, Laredo | 350.49 | 490.68 |
| Killam, Randel Wilson, Electra | 50.48 | 67.64 |
| Kemp Oil & Gas Co. of Texas, Tulsa, Okla. | 6,286.61 | 8,290.33 |
| Keener Oil & Gas Co., Cisco | 715.64 | 973.24 |
| Kleiner, Charles J., Cisco | 627.22 | 855.23 |
| Knotts, F. F., Wichita Falls | 435.01 | 509.48 |
| Kaufman, L., San Antonio | 57,646.41 | 43,234.80 |
| Kistler, Frank E., & Co., Inc., Denver, Colo. | 786.96 | 1,007.31 |
| Kynerd, W. D., Dallas | | |
| **L** | | |
| Lubell, Samuel L., et al, Tulsa, Okla. | 37,212.72 | 27,909.38 |
| Leonard Petroleum Co., Washington, Pa., (9-30-27) | 7,589.56 | 9,249.70 |
| Lake Shore Oil Co., Houston (7-30-27) | 596.35 | 715.62 |
| Lake Shore Oil Co., Houston (9-30-27) | 2,622.75 | 3,147.30 |
| Loggie and Arendt Oil Co., Albany | 2,190.98 | 2,953.40 |
| Letwin, Sam, Breckenridge | 2,114.32 | 2,748.40 |
| Lewis, M. L., Wichita Falls (9-30-27) | 391.04 | 516.17 |
| Lewis, M. L., Wichita Falls | 153.40 | 202.48 |
| Long, Roy, Oil Co., Navasota | 2,579.27 | 3,337.84 |
| Laredo Oil Co., Laredo | 2,164.91 | 2,164.91 |
| Lawson, Eugene B., Nowata, Okla. | 39,326.27 | 52,545.93 |
| Linedo Oil Co., Lincoln, Neb. | 2,454.82 | 2,454.82 |
| Lytle Oil Association, Lytle | 292.14 | 335.09 |
| Lockhart & Co., Los Angeles, Calif. | 20,353.74 | 19,751.12 |
| Lebow, C. H., Tulsa, Okla. | 846.70 | 1,166.51 |
| Levy, trustee, No. 1 Leonard M., Ranger | 4,099.36 | 6,133.86 |
| Lytle, C. F., Mexia | 15,647.34 | 19,964.68 |
| Lucey Petroleum Co., Dallas | 699.73 | 911.34 |
| Lewis, J. E., & Co., Eastland | 1,995.63 | 2,693.61 |
| Lewis, J. E., et al, Eastland | 1,366.26 | 1,786.61 |
| Lake View Oil Co., Sour Lake | 15,035.97 | 18,043.18 |
| Leonard Petroleum Co., Washington, Pa. | 6,829.18 | 8,307.56 |
| Lone Star Gas Co., Dallas | 10,079.81 | 13,665.69 |
| Levy, Leonard M., trustee, No. 2, Fort Worth | 1,996.94 | 2,915.00 |
| Lackey, W. G., Tulsa, Okla. | 4,043.72 | 5,343.07 |
| Lamb and Shaw, Brownwood | 764.66 | 986.10 |
| Lamb, George E., Brownwood | 298.47 | 386.89 |
| Lowe, Delaney and Carter, De Leon | 1,817.54 | 2,490.58 |
| Lee, Homer, Wichita Falls | 1,963.63 | 2,670.53 |
| Leonard Oil Co., Somerset | 324.34 | 389.19 |
| Leonard, George, Somerset | 470.96 | 559.69 |
| Lesh, John L., & Co., Wichita Falls | 9,865.00 | 10,207.38 |
| Louisiana Oil Refining Corp., Shreveport, La. | 26,181.56 | 32,174.38 |
| Langford, W. S., Wichita Falls | 1,307.92 | 1,724.80 |
| Lake Graham Oil Co., Houston | 1,899.04 | 2,601.67 |
| Lowry Oil Corp., Wichita Falls | 2,157.78 | 3,033.35 |
| Lucky Ten Oil Co., Amarillo | 12,258.80 | 10,621.94 |
| Little, William, Breckenridge | 214.12 | 270.44 |
| Larkin, W. B., Burnett, et al, Wichita Falls | 468.66 | 629.77 |
| Lesh-Kilcrease & Co., Nocona | 3,841.25 | 4,313.84 |
| Lesh and McCall, Nocona | 38,867.51 | 39,320.96 |
| Lowenstein Oil Co., Rockdale | 1,516.64 | 1,926.37 |
| Liberty Oil & Gas Co., Baltimore, Md. | 1,340.77 | 1,696.23 |
| Lain Oil Co., San Antonio | 1,415.05 | 1,677.82 |
| Lake Erie Trust Co., The, trustee, Cleveland, Ohio | 818.67 | 1,119.39 |
| Landreth Production Corp., Fort Worth | 1,550,958.22 | 930,575.54 |
| Little Caddo Synd., Fort Worth | 1,138.76 | 1,512.32 |
| Lee and Simon, Cisco | 246.28 | 333.68 |
| Len-Cook Oil Co., Electra | 692.60 | 938.85 |
| **Mc** | | |
| McBride, W. C., Inc., St. Louis, Mo. | 2,987.52 | 3,563.83 |
| McNamara Oil Co., Beaumont | 2,587.16 | 3,104.59 |
| McMurray, Root & Rhodes, Eastland | 1,736.00 | 2,372.00 |
| McJunkin, Florence, Ranger | 768.27 | 1,142.40 |
| McCutcheon, C. E., trustee, Wichita Falls | 7,109.63 | 9,592.23 |
| McLester Oil Co., Breckenridge | 4,898.00 | 6,348.00 |
| McCullough, Everett, Wichita Falls | 556.81 | 746.52 |
| McCormick & Noack, Rockdale | 394.84 | 501.45 |
| McIlroy Oil Co., Amarillo | 234,521.01 | 175,890.80 |
| McNallen & Griffin, Tulsa, Okla. | 3,934.89 | 5,0 5.93 |
| McLester Oil Co., Eastland | 57,760.00 | 83,841.22 |
| McCarter, R. C., Cisco | 538.60 | 721.58 |
| McLester Oil Co., Breckenridge | 9,420.00 | 14,212.92 |
| McCoy, J. H., Tulsa, Okla. | 218.29 | 320.41 |
| McCheeney, Nancy, Olney | 6,085.16 | 8,196.21 |
| McCarty Oil Co., Wichita Falls | 90,062.11 | 125,157.64 |
| McDonald, M. C., Putnam | 5,522.99 | 7,448.81 |
| McDonald, W. W., et al, Dallas | 12,516.94 | 16,936.19 |
| McMurray, J. L., et al, Cisco | 4,124.23 | 5,704.80 |
| McElreath & Suggett and Anderson & Gous, Wichita Falls | 1,732.96 | 2,226.02 |
| McMan Oil & Gas Co., Tulsa, Okla. | 332,475.65 | 268,245.07 |
| McCrary, E. W., Tulsa, Okla. | 3,930.48 | 5,047.21 |
| McEwan, J. P., Fort Worth | 1,422.14 | 1,842.72 |
| McDaniel, E. R., Cisco | 5,853.13 | 8,230.88 |
| McNallen and Letwin, Breckenridge | 941.28 | 1,236.65 |
| **M** | | |
| Magee Brothers, Electra | 677.88 | 938.76 |
| Magee and Stipe, Electra | 946.46 | 1,285.92 |
| Majestic Oil Co., The, Amarillo | 24,011.96 | 23,977.81 |
| Mid-Texas Petroleum Co., Oklahoma City, Okla. | 17,901.85 | 24,324.21 |
| Miller and Miller, Putnam | 505.96 | 677.98 |
| Moore, F. L., trustee, Tulsa, Okla. | 3,762.72 | 4,959.99 |
| Murphey, J. A., Mineral Wells | 323.27 | 406.04 |
| Magnolia Petroleum Co., Dallas | 3,125,352.88 | 3,197,347.27 |
| May, F. N., Santa Anna | 251.00 | 283.63 |
| Mohegan Oil Co., Mohegan Lake, N. Y. | 125.68 | 157.73 |
| Mills and Garrety, Corsicana | 2,216.40 | 2,770.50 |
| Minor Oil Co., Beaumont | 7,832.48 | 9,398.98 |
| Marland Oil Co. of Texas, Fort Worth | 1,047,009.49 | 812,173.60 |
| Moore and Henderson, Tulsa, Okla. | 428.04 | 596.96 |
| Mary Elizabeth Oil Co., Dallas | 10.17 | 13.45 |
| Martin Petroleum Co., Humble | 3,385.81 | 4,063.20 |
| Mennis, G. W., Wichita Falls | 4,822.32 | 6,667.74 |
| Midwest Exploration Co., The, Amarillo | 196,082.25 | 161,954.92 |
| Madeen and Hunt, Olney | 4,135.18 | 5,623.85 |
| Merrick and Bristow, Ardmore, Okla. | 6,819.61 | 6,358.86 |
| Maben Oil Corp., Wichita Falls | 638.32 | 840.41 |
| Moutray & Son, Abilene | 551.20 | 703.90 |
| Mid-Kansas Oil & Gas Co., Findlay, Ohio | 981,599.99 | 634,091.20 |
| Mook Texas Oil Co., Inc., Fort Worth | 17,087.04 | 23,348.15 |
| Macknold Co., San Antonio | 326.09 | 382.64 |
| Minerva Petroleum Co., Minerva | 1,231.64 | 1,577.97 |
| Milham Corp. of Texas, San Antonio | 108,205.08 | 135,399.23 |
| Matador Oil & Gas Co., The, Quanah | 221.12 | 291.74 |
| Moore, N. A., Eastland | 1,322.69 | 1,861.33 |
| Mecom Oil Co., Liberty | 22,696.74 | 27,236.09 |
| Montgomery, Rea, Montgomery, Sedwick | 2,293.12 | 3,026.91 |
| Maer & Staniforth, Wichita Falls | 2,719.18 | 3,064.18 |
| Medio Oil Co., San Antonio | 229.33 | 286.66 |
| Marnet Oil Co., Tulsa, Okla. | 4,275.46 | 5,568.32 |
| Moran, W. J., Wichita Falls | 3,002.87 | 4,146.80 |
| Monarch Royalty Corp., Kansas City, Mo. | 41,195.00 | 21,707.08 |
| Moutray Oil Co., Abilene | 115,516.74 | 153,005.76 |
| Mues & McDermott, Fort Worth | 426.81 | 544.74 |
| Mann, F. A., Graham | 1,187.00 | 1,6 8.00 |
| Meridian Petroleum Corp., Tulsa, Okla. | 3,8 0.01 | 5,104.59 |
| Meredith, J. D., Moran | 4,282.57 | 4,794.76 |
| Maxwell, J. C., Fort Worth | 210,8 0.76 | 130,.13.28 |
| Moody Corporation, Houston | 93,193.38 | 112,898.88 |
| Minnehoma Oil & Gas Co., Tulsa, Okla. | 14,691.91 | 11,018.93 |
| Margay Oil Corp., Tulsa, Okla. | 3,273.12 | 4,181.51 |
| Mid-Continent Petroleum Corp., Tulsa, Okla. | 16,128.07 | 21,326.79 |
| Morton, A. D., Bartlesville | 765.07 | 872.14 |
| Maxson & Company, Wichita Falls | 1 600.91 | 2,145.20 |
| Midwest & Gulf of Texas Trust Estate, Tulsa Okla. | 1,150.46 | 1,380.54 |
| Mitcham, G. P., Cisco | 561.04 | 665.85 |
| Milam Production Co., Rockdale | 633.21 | 802.30 |
| Mendenhall Oil Co., Cross Cut | 2,232.10 | 3,089.64 |
| Moss, Keeling, et al, Mexia | 7,618.94 | 9,980.81 |
| Moss & Keeling (Rosson lease), Mexia | 1,747.14 | 2,277.93 |
| Moss & Urschel, Mexia | 6,336.93 | 8,091.43 |
| Moss, Urschel & Keys, Mexia | 16,042.77 | 20,534.74 |
| Moss & Keeling (Simmons lease), Mexia | 2,194.04 | 2,940.01 |
| M. & V. Oil Co., Wichita Falls | 7,136.19 | 9,640.99 |
| Murchison Oil Co., Wichita Falls | 83,939.97 | 60,377.34 |
| Madison Oil & Gas Co., Fort Worth | 9,098.37 | 12,606.86 |
| Minntex Oil Corp., Wichita Falls | 815.11 | 833.21 |


GARLOCK

## Gas Compressor Metal Packing That Does Not Leak



## GARLOCK-875

For Piston Rods in Good Condition

*High Pressure Service*

Garlock-875 is an improved design Gas Compressor Metal Packing which, after severe service tests, has established itself as the ultimate packing for this purpose.

It reduces operating cost as it will not score or wear the rod out of round. The combination breaker-scraper rings remove the sand and grit, an abrasive element, from the piston rod and the method of lubricating allows the rod and rings to work in an oil bath.

The High Pressure Packing is an assembly of eight sections of rings, two pressure-scraper rings and six double packing rings, enclosed in a sectional cup case as illustrated, or a split case if required. All parts of the packing are accurately machined and ground. The rings are manufactured from high carbon content interstitial cast iron and so designed that incorrect application is impossible.

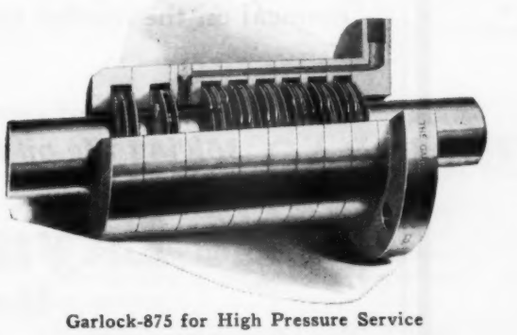
The High Pressure Packing is recommended for Gas Compressor Service handling all medium and high pressures.

*Low Pressure Service*

Garlock-875 is also supplied to work against low pressures. It is made of the same material as the High Pressure Packing with a slight change in design. Five sections of double packing rings are enclosed in a sectional cup case, or a split case as may be specified. Where gas containing grit is encountered one of the double packing rings is eliminated and one or two breaker-scraper rings substituted.

*Blue Prints and Specifications*

*Complete specifications and blue prints will be supplied upon application. We suggest that you write our nearest Oil Field Sales Office.*



Garlock-875 for High Pressure Service

The Garlock Packing Company

Palmyra, New York

*Oil Field Warehouses and Sales Offices*

Houston, Texas — Tulsa, Okla. — Los Angeles, Calif.
Pittsburgh, Penna. — Cleveland, Ohio — Denver, Colo.

The Standard Packing of the World

# Greater Inlet Area—

*with* THE LAYNE

# Mill Grooved

**Keystone wire wrapped**

# Screen—

*The new mill grooved pipe. Note greatly increased inlet surface.*

*Increased Inlet without weakening the screen.*

*Fully Protected by Patents*

**All the advantages of the famous Keystone wire wrapped screen plus the mill grooved openings, which almost doubles the fluid inlet area, makes the new Layne Screen the most useful and economical on the market today.**

***Take advantage of our quarter of a century's experience in solving the oil industry's screening problems***

## The Layne & Bowler Co.

**Houston, Texas**

THE LAYNE-NEW YORK CO.
30 Church St., New York

The LAYNE & BOWLER CORP.
Los Angeles, Calif.

VICKERS LIMITED
London, England

| Name and address— | Barrels | Value |
|---|---|---|
| Manhattan Oil Co., Kansas City, Mo. | 11,506.49 | 11,500.86 |
| Marsalis Bros., Humble | 1,314.12 | 1,576.80 |
| Maxson & Co., Wichita Falls (9-30-27) | 1,583.18 | 2,121.46 |
| Maxson & Co., Wichita Falls (6-30-27) | 1,807.02 | 2,425.41 |
| Medina Oil & Gas Co., San Antonio | 267.56 | 321.07 |
| Moore, W. M., Wichita Falls (4-1 to 12-31-27) | 8,994.01 | 10,772.93 |
| Moellendick, Fred, Cisco (9-30-27) | 1,599.98 | 2,103.63 |
| **N** | | |
| National Oil Co., San Antonio | 946.80 | 1,098.29 |
| Nabob Oil Co., Amarillo (9-30-27) | 8,892.06 | 10,337.94 |
| New Oil Co. and Homer Slicker, Cisco | 911.63 | 1,153.30 |
| Navarro Oil Co., Houston | 159,423.62 | 202,223.49 |
| Newport & Ohio Petroleum Co., Newport, N. Y. | 426.01 | 566.25 |
| Number Nine Oil Corp., Tulsa, Okla. | 2,743.78 | 3,715.57 |
| Necessity Oil Corp., Dallas | 2,141.71 | 2,353.83 |
| Noble-Thomas Oil Co., Wichita Falls | 414.56 | 514.05 |
| Newton-Palmer Oil Co., Rockdale | 838.25 | 1,052.39 |
| New Domain Oil & Gas Co., Pittsburgh, Pa. | 6,531.64 | 4,898.73 |
| Nimrod Oil Co. et al, Dallas | 453.41 | 628.75 |
| Noble Oil & Gas Co., Tulsa, Okla. | 3,896.91 | 5,053.38 |
| National Petroleum & Refining Co., Wichita Falls | 969.95 | 1,288.10 |
| Nutt & Gates, Wichita Falls | 1,687.59 | 2,327.18 |
| Nabob Oil & Gas Co., Amarillo | 9,974.30 | 10,560.37 |
| National Investment Co. and Floyd Jones, Breckenridge | 2,685.23 | 3,658.08 |
| Noack & Lanning, Rockdale | 1,202.65 | 1,600.00 |
| North Fork Oil Co., Amarillo | 5,136.04 | 3,852.04 |
| Nunn McCauley O'l Co., Amarillo | 19,661.95 | 14,746.47 |
| Norman Oil Co., Wichita Falls | 2,061.36 | 2,803.47 |
| Noack Oil Co., Rockdale | 2,638.60 | 3,377.40 |
| **O** | | |
| Olden, William P., Iowa Park | 1,455.00 | 1,999.18 |
| Owenwood Pool No. 3 J. W. Robbins, trustee, Fort Worth | 5,342.00 | 6,784.88 |
| Owenwood Oil Corp., Fort Worth | 1,796.00 | 2,283.41 |
| O'Neil, John, Wichita Falls | 14,174.92 | 19,415.58 |
| Ohio Somerset Oil Co., Cleveland, Ohio | 1,837.95 | 1,929.85 |
| Overby, J. D., Iowa Park | 639.39 | 857.16 |
| Oil Investment Co., Wichita Falls | 3,557.41 | 4,707.56 |
| Old Colony Oil Co., Dayton | 2,771.71 | 3,326.05 |
| Ocean Oil & Refin'ng Co., El Paso | 1,169.94 | 1,357.13 |
| Ocean Oil & Refining Co., El Paso (9-30-27) | 1,167.72 | 1,355.55 |
| Osage Development Co., Bartlesville, Okla. | 1,889.54 | 1,889.54 |
| Omohundro, W. B., Wichita Falls | 3,236.88 | 4,706.07 |
| Oil Operators Trust, Fort Worth | 58,519.76 | 68,587.24 |
| Oltex Oil Co., Fort Worth | 2,471.14 | 3,237.19 |
| Olean Petroleum Co., Bristow, Okla. | 37,078.17 | 39,210.77 |
| Oil States Petroleum Co., Enid, Okla. | 2,131.37 | 1,306.58 |
| Orange Petroleum Corp., Orange | 29,524.58 | 35,425.42 |
| Oriental Oil Co., Dallas | 1,290.37 | 1,654.16 |
| Oktaha Co., The, Tulsa, Okla. | 844.18 | 1,193.32 |
| Omilak Oil Co., Spokane, Wash. | 278.00 | 333.60 |
| Owens Oil Co., Brownwood | 1,137.45 | 1,319.45 |
| Osborn, R. R., Amarillo | 12,304.47 | 13,390.02 |
| Orth, Thomas R. T., Wichita Falls | 422.26 | 480.89 |
| Old Ocean Oil Co., Kansas City, Mo. | 4,204.68 | 4,620.00 |
| Olney Oil & Refining Co., Olney | 986.39 | 1,313.81 |
| **P** | | |
| Preston Oil & Gas Co., Brownwood | 333.00 | 422.77 |
| P. & M. Oil Co., Tulsa, Okla. | 107.88 | 144.80 |
| Pennowa Oil & Gas Co., Skiatook, Okla. | 21,059.34 | 15,794.53 |
| Phillips Petroleum Co., Bartlesville, Okla. | 2,192,109.06 | 1,930,518.34 |
| Prairie Oil & Gas Co., Independence, Kans. | 119,926.16 | 112,779.18 |
| Prairie Oil & Gas Co., Independence, Kans. | 1,660,032.62 | 1,316,791.82 |
| Pollard, W. E. and C. E., Pampa | 10,415.61 | 10,807.03 |
| Pollard, W. E. and C. E., Pampa (9-30-27) | 1,998.08 | 2,038.60 |
| Palo Duro Oil Co., Amarillo | 14,258.86 | 10,694.17 |
| Prather, Ed. Special, Houston | 328.56 | 416.38 |
| Pinto Oil Co., Mineral Wells | 655.98 | 800.29 |
| Pigg & Murchison, Vernon | 456.00 | 583.68 |
| Pivoto, M. E., Sour Lake | 3,468.61 | 4,162.33 |
| Pois, M. et al, Wichita Falls | 5,318.68 | 7,233.40 |
| Pois, M., trustee, Wichita Falls | 359.05 | 481.15 |
| Pois & Johnson, Wichita Falls | 1,283.40 | 1,745.40 |
| Plains Production Co., Wichita Falls | 2,512.38 | 2,928.28 |
| Parry Oil Co. of Texas, Inc., Fort Worth | 1,267.81 | 1,642.69 |
| Pois, Fine & Schulz, Wichita Falls | 2,041.65 | 2,795.32 |
| Petroleum Investment Co., Fort Worth | 4,574.28 | 6,190.86 |
| Price-Rusell & Co., Ranger | 5,458.46 | 7,271.38 |
| Primrose Oil Co., Sour Lake | 1,053.05 | 1,263.65 |
| Pomona Mutual Oil Syndicate, Pomona, Calif. | 3,197.77 | 4,378.59 |
| Putnam Oil Co., Tulsa, Okla. | 61,866.88 | 81,640.06 |
| Prescott-Phoenix Oil & Gas Co., A. C. Trumbo, trustee, Muskogee | 155.52 | 194.83 |
| Piper, L. E., Vernon | 2,012.23 | 2,656.11 |
| Progressive Production Co., Kansas City, Mo. | 2,718.49 | 3,716.13 |
| Panden Oil Corp., Dallas | 32,382.63 | 42,936.91 |
| Paraffine Oil Co., Houston | 14,121.66 | 16,945.99 |
| Portland Drilling Corp., Wichita Falls | 1,296.76 | 1,728.43 |
| Philp Brothers, Beaumont | 1,677.94 | 2,013.84 |
| Payne, P. G., et al, Wichita Falls | 2,375.08 | 3,277.61 |
| Prescott-Phoenix Oil & Gas Co., Wichita Falls | 1,859.14 | 2,412.37 |
| Pantex Oil Co., Fall River, Mass. | 41,056.00 | 30,792.00 |
| Pickens & Lewis, Dallas | 1,534.16 | 2,204.80 |
| Powell, J. L., Wichita Falls | 437.71 | 583.21 |
| Parsons, Ed V., Fort Worth | 232.16 | 337.13 |
| Paull Oil Co., Graham | 7,000.23 | 9,696.09 |
| Peery-Moran & Woody, Wichita Falls | 12,172.00 | 16,553.87 |
| Producers Supply & Tool, Marietta, Ohio | 361.87 | 476.75 |
| Powers Production Co., Houston | 3,275.18 | 3,275.18 |
| Pitzer & West, Breckenridge | 94,789.17 | 137,444.30 |
| Pure Oil Co., Chicago, Ill. | 862,194.06 | 1,005,124.03 |
| Pinto Oil Co., Mineral Wells | 1,059.94 | 1,324.92 |
| Pemeta Oil Co., Fort Worth | 5,069.71 | 6,627.24 |
| Palmer, Freddie, Oil Co., Rockdale | 795.00 | 956.98 |
| Pilkinton & Windham, Burkburnett | 3,430.67 | 4,597.10 |
| Perkins & Cullum, Wichita Falls | 51,434.88 | 66,364.17 |
| Petroleum Venture Co., Somerset | 320.40 | 312.33 |
| Petroleum Producers Co., Wichita Falls | 110,304.72 | 148,682.46 |
| Paramount Oil Corp., Amarillo | 85,912.84 | 64,434.63 |
| Producers Drilling Co., Wichita Falls | 9,889.54 | 13,139.20 |
| Paggi Brothers Oil Co., Beaumont | 18,780.39 | 22,238.07 |
| Paggi, Charles, & Co., Beaumont | 1,869.48 | 2,171.38 |
| Phillips, W. G. & J. B. Milam, Chelsea, Okla. | 121.00 | 159.68 |
| Pickens & Lewis, Dallas | 1,343.70 | 1,935.02 |
| Panhandle Refining Co., Wichita Falls | 370,364.23 | 501,868.37 |
| Pecos Oil Co., Crane | 425,541.12 | 255,390.68 |
| Perkins, J. J., Wichita Falls | 3,665.36 | 4,900.96 |
| Poor Boy Oil Co., Rockdale (9-30-27) | 716.75 | 931.77 |
| Phillips, J. R. (Heywood), Amarillo | 22,527.29 | 28,159.11 |
| Phillips, J. R. (Weatherly), Amarillo | 617.95 | 463.47 |
| Phillips, J. R. (Currie), Amarillo | 22,012.04 | 16,509.05 |
| Pace & Ward, Breckenridge | 2,127.70 | 2,866.00 |
| Pioneer Oil Gas & Refining Co., Danville, Ill. | 1,445.87 | 1,557.89 |
| Prairie Lee Production Co., San Antonio | 11,006.76 | 11,006.76 |
| Pace, George L., Wichita Falls | 903.51 | 1,340.00 |
| Pennok Oil Co., Tulsa, Okla. | 23,237.52 | 28,154.09 |
| Phillips, J. R., Invador Drilling Co., Amarillo | 58,706.39 | 44,029.84 |
| Pilkinton, F. L., Burkburnett | 2,462.93 | 3,226.43 |
| Proctor Oil Co., Wichita Falls (9-30-27) | 3,197.99 | 4,421.44 |
| P-M Drilling Co., Chelsea, Okla. | 339.54 | 457.67 |
| Py-Tex Oil Co., Winchester, Ky. | 7,425.13 | 10,629.32 |
| Phillips, Otis, receiver, Amarillo | 26,368.22 | 18,729.00 |
| **Q** | | |
| Quinn, J. W., et al, Eastland | 42,819.80 | 61,668.42 |
| Quartet Oil Co., Tulsa, Okla. | 9,372.66 | 13,172.27 |
| Quakins Petroleum Co., Ranger | 3,930.68 | 5,343.75 |
| Quincy Oil Co., Electra | 142.48 | 193.67 |
| **R** | | |
| Rosenberg, Jacob, trustee, Tulsa, Okla. | 41.75 | 53.12 |
| Rosenberg, J., Tulsa, Okla. | 136.57 | 176.43 |
| Rubsam & Hunter, Wichita Falls | 2,928.99 | 3,955.55 |
| Rockdale Oil Co., Rockdale | 161.98 | 202.59 |
| Ross & Slicker O'l Co., Cisco | 1,118.28 | 1,467.98 |
| Rolyat Production Co., Houston | 6,904.08 | 8,228.45 |
| Rountree & Simpson, Rockdale | 301.41 | 399.30 |
| Rountree, Russell & Kemp, Rockdale | 940.95 | 1,224.90 |

**"TOLEDOS"—AN EXAMPLE OF ENDURING LEADERSHIP**

"TOLEDOS" for over a quarter of a century have been the recognized standard for pipe tools among experienced users.

Today more than ever before those who know, make sure the pipe threading and cutting tools they use, where results count, are genuine "TOLEDOS", bearing both the name and trade mark. You should find them in the stock of your nearest supply dealer.

IF YOU BUY BY COMPARISON YOU WILL BUY A "TOLEDO"

THE TOLEDO PIPE THREADING MACHINE CO.
TOLEDO, OHIO New York Office, 72 Lafayette St.

**Repeaters—Every One**

These Kanotex Petroleum Products invariably "make good." Their Quality is Unvarying; their Performance such that the "first timer" is quickly converted to a "repeater."

**KANOTEX OFFERS**

42-44 W.W. Kerosene

60-62—400 Endpoint 64-66—390 Endpoint
64-66—375 Endpoint 68-70—350 to 360 Endpoint

ALL FULLY TREATED

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**KANT-NOX GASOLINE**

Filtered and treated in the vapor phase through Gray Polymerizers. An ideal motor fuel for all motor cars, and especially adapted to the new high compression motors.

PROMPT SHIPMENT IN TANK CARS ANYWHERE

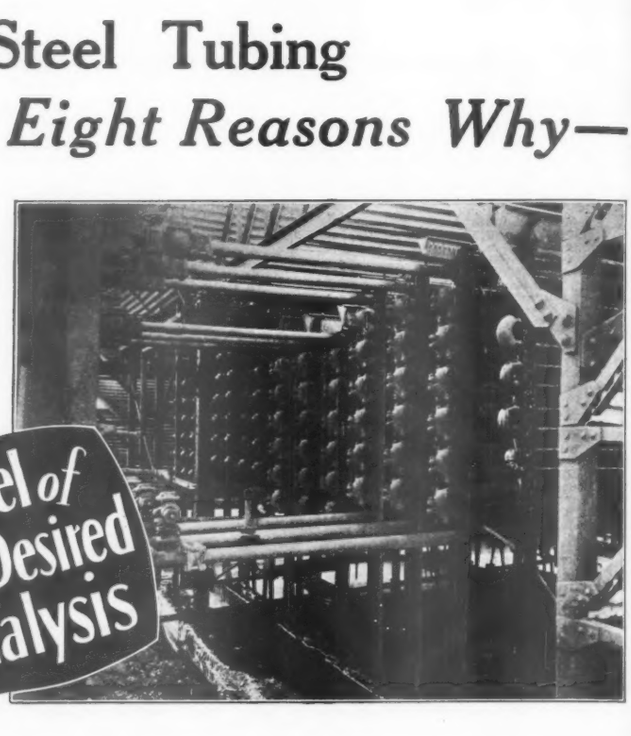
*Write or wire your requirements today.*

**THE KANOTEX REFINING CO.**

Phone LD4, Arkansas City, Kans.

# Use More Seamless Steel Tubing
## Here are *Eight Reasons Why*—

*Reason Number* **1**




**The eight reasons are:**

1. Made of steel of any desired analysis.
2. Uniform texture of the metal.
3. No weld.
4. Maximum strength.
5. No weak spots.
6. Minimum internal strains.
7. Longer life.
8. Safety.

The Seamless method of making steel tubes overcomes the limitations of all other methods now used in tube manufacture. By this method, steels of different alloys and analyses can be used. In addition—The piercing and rolling processes employed in making Pittsburgh Steel Tubes produce a fine texture in the metal similar to that of drop forged steel. Thus tubes and pipe that are to be used for specific purposes such as refining and all high pressure piping can be made to definite specifications. This insures better service, longer life and greater maintenance economy.

For over 20 years our entire resources have been focused on one objective—how to make a better seamless tube. Today our methods are the most up to date that engineers and scientists have developed. Due to this carefully concentrated attention on only one type of tubing, we have become the largest company in America devoted exclusively to its manufacture.

Your inquiry sent to one of the following offices will be given immediate attention.

Pittsburgh Seamless tubing and pipe can be used to advantage for—
Cracking stills
Boiler tubes
Superheater tubes
Arch Tubes Dry Pipes
Water Wall tubes
Chemical tubes
Heating systems
Steam lines
All High Pressure piping
Available in all sizes up to 13⅜ O.D. including pipe sizes.

**Pittsburgh Steel Products Co.**

DIVISION OF

**Pittsburgh Steel Co.**

PITTSBURGH NEW YORK DETROIT CHICAGO HOUSTON TULSA

**Pittsburgh Seamless**

*Seamless Steel Tubes are the modern standard for all tubular steel purposes.*

*Why not adopt Pittsburgh Seamless now and benefit by its greater safety and economy.*

| Name and address— | Barrels | Value |
|---|---|---|
| Rountree, White & Simpson, Rockdale | 1,596.04 | 2,138.69 |
| Reinhart, M. J., trustee, Oklahoma City, Okla. | 627.11 | 839.68 |
| Robinson, Arthur D., et al, Dallas | 1,029.01 | 1,386.55 |
| Robinson, Arthur D., Dallas | 6,274.67 | 9,199.68 |
| Rhader & Carey, Wichita Falls | 8,531.93 | 11,055.67 |
| Ramsey, E. H., Rising Star | 1,358.06 | 1,887.44 |
| Rannell Co., The, Oklahoma City, Okla. | 6,736.04 | 8,957.54 |
| Rocser & Pendelton, Inc., Fort Worth | 118,541.51 | 156,287.16 |
| Rowe, J. G., Wichita Falls | 1,646.41 | 2,158.04 |
| Rycade Oil Corp., Houston | 218,855.08 | 259,660.57 |
| Rentex Oil Co., San Antonio | 10,198.64 | 12,401.31 |
| Ruyle Farm Oil Co., Wichita Falls | 8,266.77 | 11,152.56 |
| Red River Oil Co., Tulsa, Okla. | 22,225.93 | 30,216.89 |
| Relief Oil Co., Amarillo | 13,766.08 | 10,324.59 |
| Ramsel, W. T., Oil Co., Rockdale | 2,958.17 | 3,816.03 |
| Russell & Wilson, Wichita Falls | 10,315.20 | 13,214.55 |
| Rio Bravo Oil Co., Houston | 783,751.66 | 961,561.40 |
| Rockdale, Jr., Oil Co., Rockdale | 453.12 | 584.55 |
| Robert Oil Corp., Breckenridge | 9,580.51 | 12,646.27 |
| Rhodes & Highers, Breckenridge | 5,846.48 | 7,717.35 |
| Rex Petroleum Corp., Orange | 21,987.16 | 26,384.58 |
| Republic Production Co., Houston | 746,856.62 | 842,294.05 |
| Rowan, A. H., trustee, Fort Worth | 1,001.18 | 1,285.64 |
| Ruwaldt, E. J., Gainesville | 4,291.30 | 5,021.31 |
| Riner & Bailey, Wichita Falls | 64,058.34 | 85,379.13 |
| Root, Rhodes, Gillman & McMurray, Eastland | 23,435.00 | 31,890.00 |
| Root & Rhodes, Eastland | 4,645.00 | 6,501.00 |
| Root, C. M., Eastland | 46,919.00 | 68,188.00 |
| Root, C. M., et al, Eastland | 1,193.00 | 1,539.00 |
| Root & Fehl, Eastland | 11,497.00 | 15,922.00 |
| Roxana Petroleum Corp., St. Louis, Mo. | 1,122,990.13 | 911,424.01 |
| Russell-Sanderson Oil Co. No. 2, Fort Worth | 962.15 | 1,332.10 |
| Rochmill, Henry, trustee, Fort Worth | 2,843.49 | 3,671.06 |
| Rowe, M. D., Wichita Falls | 2,078.87 | 2,810.87 |
| Ramming, W. F., Wichita Falls | 37.97 | 52.41 |
| Ramming & Saunders, Wichita Falls | 4,757.12 | 6,797.51 |
| Ramming, R. W., Wichita Falls | 9.03 | 12.09 |
| Ramming, Staley & Ramming, Wichita Falls | 787.06 | 1,076.56 |
| Riggs & Oliphant, Graham | 289.00 | 349.18 |
| Rockdale Development Co., Rockdale | 1,709.11 | 2,154.88 |
| Ryan Consolidated Petroleum Corp., Bartlesville, Okla. | 59,722.20 | 65,651.96 |
| Ruby Oil Co., Minerva | 316.10 | 401.67 |
| Rex-Tex Oil Co., Winchester, Ky. | 7,425.13 | 10,629.32 |
| Ross Amigos Oil Co., Laredo | 12,210.34 | 12,210.34 |
| Ross Amigos Oil Co., Laredo (9-30-27) | 12,165.26 | 12,165.26 |
| Rose Segunda Oil Co., Laredo (9-30-27) | 1,291.06 | 1,291.06 |
| Rio Grande Petroleum Corp., Houston | 4,325.98 | 4,325.98 |
| Ross, C. E., Burkburnett | 636.75 | 894.38 |
| Ross Segunda Oil Co., Laredo | 1,244.39 | 1,244.39 |
| Ramsey & Decker, Breckenridge | 2,819.68 | 3,665.58 |
| Ray Featherstone Oil Co., Wichita Falls | 2,352.00 | 3,186.97 |
| Ray & Massie, Wichita Falls | 17,020.84 | 23,019.34 |
| Reclamation Co., The, Fort Worth | 9,159.40 | 11,923.96 |
| Red Bank Oil Co., Tulsa, Okla. | 40,933.13 | 46,389.30 |
| Reiter-Foster Oil Corp., Tulsa, Okla. | 11,336.51 | 15,074.56 |
| Rockwell, J. A., & Co., Warren, Pa. | 2,748.17 | 3,479.39 |
| Rock Creek Oil Corporation, Houston | 15,957.54 | 12,038.80 |
| Ray-O-Oil Corp., Houston | 2,325.02 | 2,790.02 |
| Ruthada Oil Co., Oklahoma City, Okla. | 23,256.90 | 27,260.89 |
| Regna Oil Co., Saratoga | 5,283.51 | 5,542.03 |
| Robinson, O. D., Pittsburgh, Pa. | 1,871.98 | 2,115.34 |
| **S** | | |
| Swastika Petroleum Corp., Wichita, Kans. | 999.04 | 1,278.50 |
| Seaboard Oil & Gas Co., Wichita Falls | 39,686.25 | 53,817.18 |
| Shackelford Oil Co., Ranger | 2,038.46 | 2,701.25 |
| St. Albans, Edward, Laredo | 4,793.46 | 4,793.46 |
| Shamrock Oil Co., Inc., Wichita Falls | 10,787.57 | 11,919.34 |
| Schuls & Pois, Wichita Falls | 260.84 | 354.74 |
| Stidham & Thrasher, Electra | 347.46 | 208.48 |
| Steed, Paul P., Wichita Falls | 4,176.62 | 5,578.62 |
| Speed, C. M., manager, Corsicana | 328.31 | 431.48 |
| Strelsky & Gambell, Rockdale | 805.92 | 1,039.63 |
| Swanner, John L., Wichita Falls | 3,225.82 | 4,320.97 |
| Steed, Paul P., Wichita Falls | 371.90 | 471.64 |
| Stella Oil Co., Beaumont | 13,549.84 | 16,259.80 |
| Sessions, I. P., Rockdale | 426.55 | 557.99 |
| Schlicher Oil Co., Beaumont | 831.02 | 801.02 |
| Somerset Crude Oil & Refining Co., Somerset | 3,750.98 | 4,555.46 |
| Smith & Bynum, Amarillo | 5,498.99 | 4,124.24 |
| Smith, Mrs. James L., Amarillo | 12,055.17 | 9,041.38 |
| Saigh, N. A., San Antonio | 1,739.98 | 2,225.89 |
| Sircvich & Thomas, Houston | 786.34 | 880.70 |
| Shaw, Fox & Adams, Burkett | 3,815.10 | 4,478.10 |
| Shaw, Archie, Burkett | 11,494.39 | 14,024.17 |
| Shappell Oil Co., Wichita Falls | 48,455.63 | 65,868.32 |
| Scott & Britton, Graham | 273.57 | 356.80 |
| Schaffner, E. N., et al, Cross Plains | 3,300.14 | 4,569.77 |
| Smith, R. E., Houston | 15,457.70 | 19,924.57 |
| Standard Oil Land & Leasing Co., Electra | 344.48 | 463.27 |
| Salado Oil Co., San Antonio | 1,942.41 | 2,462.35 |
| Skinner, E. W., Oil Co., Saratoga | 6,094.99 | 6,813.35 |
| Superior Oil Producing Co., Tulsa, Okla. | 2,429.98 | 3,303.54 |
| Scarbrough, W. A., Burkburnett | 2,777.98 | 3,862.46 |
| Scarbrough, W. A., et al, Wichita Falls | 614.63 | 762.12 |
| Silk, Bullington & Clark, Wichita Falls | 8,506.49 | 7,490.87 |
| Seyler, William, Tulsa, Okla. (9-30-27) | 3,380.16 | 4,611.62 |
| Stoops, J. P., Ranger | 286.29 | 360.71 |
| Scott & Walker, Albany | 4,382.78 | 5,609.95 |
| Simmons, T. K., Tulsa, Okla. | 2,443.19 | 3,207.92 |
| Sullivan, M. J., Kansas City, Mo. | 339.86 | 432.33 |
| San Balt Petroleum Co., Kansas City, Mo. | 286.70 | 380.91 |
| St. Louis Oil & Gas Co., Wichita Falls | 645.60 | 842.67 |
| Sindorf & Sindorf, Caddo | 1,063.48 | 1,379.38 |
| Sinclair Oil & Gas Co., Houston | 92,369.29 | 112,405.80 |
| Schimmel Production Co., Fort Worth | 27,796.41 | 34,436.33 |
| Spring Creek Oil Co., Amarillo | 14,436.18 | 10,827.00 |
| Selby Oil & Gas Co., Tulsa, Okla. | 65,208.20 | 91,844.38 |
| Staley, J. A., Wichita Falls | 3,721.21 | 5,013.53 |
| Southern Petroleum Exploration, Inc., Sistersville, W. Va. | 8,757.60 | 8,444.55 |
| Staley Mashburn Oil Co., Wichita Falls | 104.59 | 136.36 |
| Sigler Oil Co., Inc., Wichita Falls | 1,382.95 | 1,727.24 |
| Supreme Oil Co., Orange | 3,781.93 | 4,538.33 |
| Summit Oil & Refining Corp., Amarillo | 16,539.94 | 12,404.95 |
| Sedwick Oil Co., Tulsa, Okla. | 17,527.18 | 22,419.97 |
| Smith, E. L., Oil Co., Inc., Mexia | 200,873.22 | 242,795.46 |
| Simms Oil Co., Dallas | 1,338,521.94 | 991,949.88 |
| Stephens Oil Co., Sour Lake | 573.77 | 688.52 |
| Snider, C. W., Wichita Falls | 1,462.75 | 2,033.40 |
| Schoolfield, R. E., Wichita Falls | 253.75 | 331.58 |
| Sunny Jim Oil Co., Tulsa, Okla. | 13,353.52 | 10,353.39 |
| Southern Exploration Co., Houston | 1,267.12 | 1,673.35 |
| Stovall, E. C., Graham | 22,341.00 | 30,580.00 |
| Shoup, O. H., Jr., Colorado Springs, Colo. | 6,058.98 | 8,342.97 |
| Stull, R. O., Wichita Falls | 17.03 | 22.38 |
| Slick, T. B., Oklahoma City, Okla. | 9,490.28 | 13,018.30 |
| St. Marys Oil & Gas Co., St. Marys, W. Va. | 25,908.10 | 29,489.62 |
| Sinclair Oil & Gas Co., Tulsa, Okla. | 205,887.47 | 284,061.36 |
| Sunburst Oil Co., Amarillo | 7,632.24 | 5,724.19 |
| Swensondale Oil Co., Caddo | 11,384.49 | 14,923.13 |
| Smith-Hanlon, Inc., Tulsa, Okla. | 183.83 | 235.95 |
| Sweeney & Henry, Abilene | 4,372.16 | 4,645.75 |
| Sheldon, C. P., Electra | 14,382.16 | 19,256.52 |
| Snowden & McSweeney Co., New York, N. Y. | 59,638.80 | 67,397.31 |
| Schaffner-Wilson, et al, Wichita Falls | 2,425.08 | 3,399.47 |
| Sink, Joel, Corsicana | 186.00 | 238.00 |
| Sun Oil Co., Dallas | 1,082,868.71 | 1,329,193.13 |
| Shasta Oil Co., Laredo | 1,314.90 | 1,314.90 |
| States Oil Corp., Eastland | 43,280.38 | 64,241.53 |
| Stribling, J. C., Llano | 5,105.82 | 7,153.31 |
| Sloan, E. H., Tulsa, Okla. | 3,689.62 | 4,701.13 |
| Shuler-Davies Co., Brownwood | 4,079.18 | 5,066.51 |
| S. & W. Oil Co., Amarillo | 19,078.71 | 13,702.84 |
| Sheldon, W. J., Electra | 2,940.25 | 4,029.59 |
| Sheman Oil & Gas Co., Pittsburgh, Pa. | 90.57 | 117.75 |
| Shaw & Rathke, Wichita Falls | 64,115.74 | 88,147.79 |
| Security Drilling Co., Wichita Falls | 489.32 | 691.05 |
| Southern Crude Oil Purchasing Co., Shreveport, La. | 847,050.47 | 508,230.30 |
| Smith, McIntosh & Thomas, Cameron | 2,375.36 | 3,017.27 |
| Silurian Oil Co., St. Louis, Mo. | 3,914.73 | 5,229.31 |
| Saunders, John R., Wichita Falls | 17.33 | 22.86 |
| Star Drilling Co., Wichita Falls | 7,143.39 | 9,740.71 |
| Saratoga Oil Co., Wichita Falls | 1,788.09 | 2,475.74 |
| Somerset Oil Co., of Massachusetts, Somerset, Mass. | 121.33 | 142.28 |
| Souligny Oil Corp., Ponca City, Okla. | 500.00 | 375.00 |
| Staley, Wynn & Co., Wichita Falls | 51,193.53 | 61,610.68 |
| Stock, H. L., Cisco | 2,341.47 | 3,159.29 |
| Stroube & Stroube, Corsicana | 69,996.54 | 88,380.88 |
| Summerfield Oil Co., Tulsa, Okla. | 334.20 | 447.80 |
| Shasta Oil Co., Wichita Falls | 1,420.74 | 1,870.45 |
| Shasta Oil Co., Laredo | 25,368.44 | 26,368.44 |
| Skia-Tex Petroleum Co., Amarillo | 63,842.11 | 47,882.07 |
| Skelly Oil Co., Tulsa, Okla. | 227,577.94 | 207,868.62 |
| Sitrin, Sam, and Morris, Tulsa, Okla. | 146.87 | 184.45 |
| Schermerhorn Oil Co., Tulsa, Okla. | 2,175.16 | 2,926.53 |
| Seybert Brothers, Morningsport, La. | 2,734.43 | 3,826.23 |
| Sheffield, Frank H., Houston | 1,752.24 | 2,102.67 |
| Shertzer Brothers, Dewey, Okla. | 16,598.91 | 22,151.31 |
| Seyler, William, Tulsa, Okla. | 831.71 | 1,147.75 |
| Staley & Co., J. I., Wichita Falls | 5,244.08 | 6,966.56 |
| Sullivan Oil Co., The, Amarillo | 1,489.17 | 1,116.88 |
| **T** | | |
| Texota Petroleum Co., Electra | 425.28 | 586.88 |
| Texas Company, The, Houston | 2,814,945.93 | 3,390,674.00 |
| Transcontinental, Tulsa, Okla. (6-30-27) | 316,046.80 | 253,052.77 |
| Transcontinental Oil Co., Tulsa, Okla. (9-30-27) | 274,332.94 | 189,080.70 |
| Thomas and Morrison, Colorado, Tex. | 1,918.00 | 1,930.64 |
| Triangle Oil Co., Brownwood | 188.22 | 249.96 |
| Turman, L. C., Fort Worth | 124,635.31 | 74,819.72 |
| Trans Bay Oil Co., Galveston (9-30-27) | 90.00 | 108.00 |
| Timblin, W. E., Wichita Falls | 129.68 | 174.80 |
| W. H. Thaxten, estate, Austin | 397.58 | 516.85 |
| Trinity Townsite Co., Dallas | 730.26 | 946.82 |
| Triangle Tel. & Gas Co., Rockdale | 2,037.08 | 3,021.08 |
| Tri-Angle Oil Co., Potter | 4,401.92 | 3,301.44 |
| Tagler, F. E., San Antonio | 48.00 | 60.00 |
| Trimount Petroleum Co., Shreveport, La. | 6,189.60 | 8,826.15 |
| Tyson Oil Co., Sour Lake | 618.84 | 742.60 |
| Texas Fidelity Oil Corp., Louisville, Ky. | 10,466.26 | 15,343.52 |
| Texas Petroleum Development Co., Cameron, Tex. | 6,655.99 | 8,912.33 |
| Texas Southern Oil & Development Co., San Antonio | 1,525.51 | 2,160.80 |
| Tillman, J. W., Humble | 472.00 | 552.24 |
| Texas Oil Corp., Dallas | 157.17 | 201.18 |
| Talley & Irick, Waskom | 187.83 | 187.83 |
| Tidwell, R. V., trustee, Graham | 7,482.13 | 9,518.10 |
| Travelers Oil Co., Amarillo | 26,495.42 | 19,871.57 |
| Texas Standard Oil Co., Houston | 898.53 | 1,164.73 |
| Terry, H. M., Sour Lake | 7,460.26 | 8,519.28 |
| Triangle Petroleum Co., The, Fort Worth | 1,499.68 | 2,034.79 |
| Texas Unity Oil Co., Dallas | 3,927.40 | 5,325.88 |
| TECI Production Co., Breckenridge | 520.95 | 667.41 |
| Two Republics Oil & Gas Co., Laredo | 11,047.40 | 11,047.40 |
| Thornton, Lomax, Jr., Wichita Falls | 6,045.13 | 8,358.17 |
| Texana Oil & Refining Co., Wichita Falls | 492.00 | 668.95 |
| Trans-Bay Oil Co., Galveston | 90.00 | 112.50 |
| Texas Pacific Coal & Oil Co., Thurber | 415,486.61 | 378,429.49 |
| Texas Pacific Coal & Oil Co., Thurber | 89,536.74 | 117,325.55 |
| Transcontinental Oil Co., Tulsa, Okla. | 89,496.53 | 117,190.88 |
| Transcontinental Oil Co., Tulsa, Okla. | 900,055.71 | 540,033.43 |
| Transcontinental Oil Co., Tulsa, Okla. | 5,872.66 | 7,664.70 |
| Texas Consodilated Oil Co., San Francisco, Calif. | 17,878.79 | 24,448.22 |
| Tidal Oil Co., Tulsa, Okla. | 501,107.99 | 357,168.78 |
| Tidal Osage Oil Co., Tulsa, Okla. | 13,460.60 | 14,049.73 |
| Tannehill, L. B., Albany | 14,183.47 | 19,840.62 |
| Texon Oil & Land Co. of Texas, Big Lake | 91,228.90 | 54,737.33 |
| Triangle Oil Co., Wichita Falls | 626.50 | 849.18 |
| Teatsworth, L., et al, Eastland | 4,361.53 | 6,530.17 |
| Tidwell, H. L., trustee, Graham | 834.80 | 1,110.05 |
| Tucker & Langford, Inc., Wichita Falls | 49,841.12 | 56,966.77 |
| Tucker, Charles J., Wichita Falls | 1,955.06 | 2,447.35 |
| Tillery, L. J., Oil Co., Inc., Beaumont | 13,688.99 | 16,651.21 |
| Tholl Oil Co., Beaumont | 5,661.08 | 7,942.83 |
| Thompson, J. E., Humble | 334.00 | 413.79 |
| Trinity Production Co., Wichita Falls | 706.56 | 963.83 |
| Tucker, W. B., Dallas | 854.35 | 1,079.75 |
| Tucker, W. B. and J. C. Fox, Dallas | 1,585.92 | 2,056.08 |
| Texas-Electra Co., The, Newark, Ohio | 378.68 | 517.84 |
| Thomasson & Co., Inc., E. M., Denver, Colo. | 1,756.95 | 2,319.17 |
| **U** | | |
| Underwood Drilling Co. (Erwin L.), Wichita Falls | 660.60 | 865.58 |
| Underwood Drilling Co. (Ward L.), Wichita Falls | 3,072.40 | 4,055.56 |
| United Oil & Fuel Co., Sour Lake | 840.29 | 1,008.29 |
| United Petroleum Co., Brownwood | 154.92 | 195.20 |
| Unity Oil Co., Beaumont | 14,072.00 | 16,927.00 |
| United Producers Co., Wichita Falls | 1,929.64 | 2,547.01 |
| Union Production Co., Rockdale | 2,048.29 | 2,048.29 |
| Unice & Carpenter, Houston | 9,217.00 | 10,326.60 |
| Ungren & Frazier, Putnam | 298.25 | 369.81 |
| Ungren & Frazier, Gibson & Johnson, Putnam | 517.96 | 695.74 |
| **V** | | |
| Virginia Oil Association, Fort Worth | 3,368.95 | 4,593.29 |
| Vacuum Oil Co., Houston | 3,542.61 | 4,589.74 |
| Val Verde Oil Co., Del Rio | 2,290.00 | 2,649.87 |
| Vergate Oil Co., Tulsa, Okla. | 7,078.65 | 9,468.21 |
| Van Cleave Trust, Baltimore, Md. | 646.56 | 900.35 |
| Veale, H. A., Dallas | 562.80 | 765.41 |
| **W** | | |
| Weller, H. J., Wichita Falls | 331.78 | 444.39 |
| Weister, E. P., Tulsa, Okla. | 1,476.42 | 1,919.46 |
| White, C. W., San Antonio | 7,229.20 | 9,296.33 |
| West, Mrs. Bessie M., Houston | 2,016.00 | 2,419.20 |
| Williams, Burt, Wichita Falls | 1,026.67 | 1,177.48 |
| Webb Oil Co., Humble | 5,142.46 | 6,170.94 |
| Watson, W. B., Fort Worth | 800.00 | 800.00 |
| Weaver & Pois, Wichita Falls | 4,400.85 | 5,845.53 |
| Wolfe, A. T., Wichita Falls | 4,837.25 | 6,382.36 |
| West, Mrs. Bessie M., Houston | 1,420.00 | 1,704.00 |
| Wilson Drilling Co., Wichita Falls | 3,913.56 | 5,315.96 |
| Wilson Drilling Co., Wichita Falls | 3,786.54 | 5,114.61 |
| Wilson Drilling Co., Wichita Falls | 4,388.11 | 5,928.25 |
| Wilson Drilling Co., Wichita Falls | 5,638.94 | 7,668.93 |
| Wilson Drilling Co., Wichita Falls | 712.64 | 464.94 |
| Woods & Bennett, Humble | 6,181.44 | 7,496.38 |
| Wills Oil Co., Rockdale | 2,685.21 | 3,415.07 |
| Wilkins, L. A., Burkburnett | 3,193.74 | 4,407.36 |
| Weller, et al, Cross Plains | 1,994.14 | 2,934.12 |
| Wakefield, M. E., et al, Cross Plains | 862.48 | 1,222.87 |
| Watkins, J. A., Wichita Falls | 315.05 | 428.46 |
| Western Oil Corp. of Texas, Wichita Falls | 23,442.99 | 28,370.53 |
| Waggoner Refining Co., Inc., Electra | 31,205.41 | 39,686.87 |
| West, J. H., Eastland | 3,046.33 | 4,167.66 |
| West, J. F., Eastland (9-30-27) | 516.64 | 534.67 |
| West, J. F., Eastland | 339.60 | 455.04 |
| Wichita Petroleum Co., Tulsa, Okla. | 2,346.80 | 3,132.21 |
| Woodburn Oil Corp., Dallas | 6,127.96 | 8,207.63 |
| Weed Gayle Oil Co., Beaumont | 76,445.06 | 91,734.08 |
| Williams, John H., Dallas | 5,289.29 | 7,075.31 |
| Wampem Oil Corp., Dallas | 2,623.58 | 3,515.60 |
| White & Duncan, Wichita Falls | 4,065.67 | 5,404.40 |
| Witcher & Michel, Wichita Falls | 282.34 | 387.04 |
| Wallace, Dr. Charles William and wife, and Hulda B. Wallace, Wichita Falls | 33,480.66 | 45,797.62 |
| Witcher, Annie L., Wichita Falls | 2,818.83 | 4,026.34 |
| Westervelt, Noble, Oklahoma City | 7,426.30 | 9,890.90 |
| Wo-Mac Oil Co., Wichita Falls | 2,168.43 | 2,949.06 |
| Wheelock & Collins, Corsicana | 39,548.44 | 54,476.03 |
| White Eagle Oil & Refining Co., Kansas City, Mo. | 85,353.00 | 64,579.88 |
| Westheimer & Daube, Ardmore, Okla. | 1,252.90 | 1,610.13 |
| Witherspoon Oil Co., San Antonio | 40,976.18 | 52,105.39 |
| Wilcox, H. F., Oil & Gas Co. of Texas, Tulsa, Okla. | 130,451.81 | 137,732.13 |
| Walker, B. S., Breckenridge | 1,436.27 | 1,846.76 |
| Woodward & Lee, Houston | 5,349.82 | 7,136.66 |

# OCS

COUNTERSHAFT CLUTCHES
CHAIN DRIVEN SAND REELS
REDUCTION UNITS
EQUALIZERS, ETC.

ARE MADE IN

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IN WHICH ONLY

OIL COUNTRY SPECIALTIES

ARE MANUFACTURED BY

THE OIL COUNTRY SPECIALTIES MFG. CO.

COFFEYVILLE, KANSAS

*Request Bulletins*


| Name and address— | Barrels | Value |
|---|---|---|
| Williams, J. F., Mineral Wells | 323.27 | 446.01 |
| Wise & Jackson, Sapulpa, Okla. | 3,912.80 | 5,044.51 |
| World Oil Co., Fort Worth | 2,549.10 | 1,911.82 |
| Western Oil Sales Corp., Wichita Falls | 13,583.97 | 17,658.17 |
| Why Not Oil Co., Mexia | 20,484.93 | 27,392.80 |
| Wilson, King, et al, Wichita Falls | 17.02 | 22.37 |
| Wichita Production Co., Wichita Falls | 18,262.86 | 24,561.01 |
| Williams, Burt, Wichita Falls | 1,380.64 | 1,801.32 |
| Wilson, Lee, et al, Wichita Falls | 8,796.17 | 11,862.76 |
| White, James. H., Wichita Falls | 317.54 | 398.14 |
| Wilson Broach Co., Beaumont | 12,583.16 | 15,999.72 |
| Wood, Benton, Lesh & McCall, Nocoma | 12,237.28 | 13,938.22 |
| West Production Co., Houston | 17,671.09 | 18,731.35 |
| Wentz, L. H., Ponca City, Okla. | 57,036.81 | 72,034.60 |
| Whitehill Oil Corp., Tulsa, Okla. | 8,179.38 | 6,870.17 |
| Whaley Mineral & Realty Trust, Fort Worth | 5,522.80 | 4,679.14 |
| Wahpoo Oil Co., Rockdale | 2,551.92 | 3,291.97 |
| Wear, G. F., Brownwood | 113.10 | 131.15 |
| Weldon Oil Co., Saratoga | 8,310.11 | 8,371.97 |
| **Y** | | |
| Young & Lee Oil Co., Beaumont | 3,363,020.44 | 4,144,811.10 |
| Young Brothers & Alexander, Inc., Fort Worth | 18,279.65 | 24,638.54 |
| **Z** | | |
| Zadie Belle Oil Co., Fort Worth | 329.58 | 446.21 |
| Totals | 56,837,258.07 | $50,242,497.13 |

## EASTERN FIELDS

(Continued from Page 65)

their test on the P. B. Williamson farm, Union district, Tyler County, to the Keener sand and have a 4-bbl. producer.

**Southwest Pennsylvania**

In southwest Pennsylvania the only notable completion of the week was the drilling deeper of a well which has been producing for some months. In Greene County, in the extension of the old Nineveh Pool, the Consumers Fuel Co. drilled its No 3 James S. Rutan 3 feet deeper in the sand and increased its production from about 20 bbls. daily to 175 bbls. This pool has been a bonanza to the operators there, at one time the new production from this extension reached over 20,000 bbls. a month but it has dwindled down to less than half of that. The increasing production of this well augurs well for the coming months.

There were several completions at the close of the week in the southwest Pennsylvania field, which resulted in one good gasser and several dry holes.

In Richill Township, Greene County, the Richill Oil & Gas Co. completed its test on the Frank Ross farm at 2,935 feet and it is a good gasser.

**Three Dry Holes**

Boundy and others completed their test on the Laura Cooper farm, Richill Township, Greene County, and it was dry in all formations to 3,143 feet. In the same township and county, the Manufacturers Light & Heat Co. completed its No. 2 on the W. J. and Cecelia Bryan farm to 3,085 feet and it was dry. In Jackson Township, Greene County, Donan and Phillips completed their test on the Arch Seals farm through 3,500 feet and it was dry.

## CANADIAN FIELDS

(Continued from Page 65)

lands, north of Turner Valley, is down 3,498 feet. In the Sweetgrass area, the Erickson Coulee well was completed as a dry gas well at 3,668 feet, the lower horizons having been found barren of oil. This well is also on a Hudson's Bay lease. Tests at Burdett, in the Bow Island gas field, and at Ribstone, on the Alberta-Saskatchewan boundary, while obtaining shows of oil were not commercially productive and were abandoned at 3,949 feet and 3,489 feet respectively.

"In all, some 30,000 feet of drilling was accomplished during the year; five of the wells drilling on January 1, 1927, are still being proceeded with; five new wells have been started; three abandoned as dry holes. No. 7 Royalite, now producing as a gas well, will be drilled to a greater depth.

**Program for 1928**

"Our drilling program for 1928 is an extensive one. The Northwest company will complete its Highwood well, and drill one other well on a favorable structure northwest of Calgary. The Royalite Oil Co. will continue drilling on wells Nos. 6, 7, 8, 9, and 10, and, as these are completed, will drill at further locations already selected, keeping four strings of tools continuously employed.

"Through an agreement with the Home Oil Co. the No. 1 well of that company now producing crude will be operated, Home No. 2 drilled to completion, and Home No. 3 proceeded with. Operations will be continued for the completions of wells Nos. 1, 5 and 6 of the Dalhousie Oil Co. The Foothills Oil & Gas Co., in addition to the further drilling of No. 1 well, will complete the well partially drilled by the Dolomite Oil Co. and will then have two strings of tools available for further drilling. The drilling of the Devenish well near Skiff has given rise to the hope that this area may prove productive, and it is possible that if the investigations now being carried on so warrant, the company may undertake drilling commitments in that part of Alberta.

**In Nova Scotia**

"It is our endeavor to add to the petroleum resources of Canada and wherever geological evidence warrants, the company is prepared to expend capital with this objective in view. As an earnest of our endeavor to that end, we are meanwhile conducting exploratory researches and diamond drilling in the Minudie district in Nova Scotia, and if these preliminary investigations prove encouraging, we will further test the area.

"Our total holdings under lease in Canada are approximately 128,500 acres, the major portion of which is under rental from the Crown."

In the Turner Valley Field the Royalite Oil Co. wells in 1927, produced 225,869 bbls., an average of 619 bbls. a day. Royalite No. 4 alone produced 217,862 bbls., compared with 200,049 bbls. in 1926, and 169,772 bbls. in 1927. The latest production figures for the various Alberta areas are as follows:

| Turner Valley—Crude Naphtha | Bbls. |
|---|---|
| Royalite Nos. 1 and 2 | 3 |
| McLeod Oil Co. No. 2 | 40 |
| Illinois-Alberta No. 1 | 91 |
| Royalite No. 7 | 99 |
| Vulcan Oils No. 1 | 100 |
| Royalite No. 4 | 621 |
| Total | 964 |

| Turner Valley—Light Crude Oil | |
|---|---|
| Okalta Oils No. 2 | 10 |
| Canada Southern No. 1 | 15 |
| Home Oil Co. No. 1 | 40 |
| McLeod Oil Co. No. 3 | 39 |
| New McDougall-Segur No. 1 | 46 |
| New McDougall-Segur No. 2 | 64 |
| Dalhousie No. 5 | 64 |
| Royalite No. 10 (potential) | 95 |
| Total | 273 |

| Wainwright—Heavy Crude | |
|---|---|
| Edmonton-Wainwright Oils | 80 |

| Skiff—Heavy Crude | |
|---|---|
| Devenish Petroleum No. 1 | 240 |

This gives a total for the various Alberta fields of 1,512 bbls. a day. These figures, so far as the crude naphtha production is concerned, fluctuate from month to month according to weather conditions, the production increasing in cold weather.

**Dalhousie Operations**

In the Turner Valley Field, Dalhousie Oil Co.'s No. 1, LSD 4, Section 18-20-2w5, is drilling 62 feet in the Madison limestone at 4,472 feet. Dalhousie No. 5, LSD 16, Section 30-19-2w5, is at 4,887 feet and drilling. Dalhousie No. 6, LSD 10, Section 13-20-3w5, is drilling at 4,663 feet.

Royalite Oil Co.'s No. 6, LSD 16, Section 31-10-2w5, is at 4,127 feet and drilling. Royalite No. 8, LSD 9, Section 12-20-3w5, is drilling at 3,188 feet. Royalite No. 9, LSD 9, Section 12-20-3w5, is drilling at 3,651 feet. Royalite No. 10, NE. Section 12-20-3w5, is at 2,332 feet

and conducting a bailing test. Royalite No. 11, LSD 10, Section 12-20-3w5, is drilling at 95 feet.

Home Oil Co.'s No. 3, LSD 14, Section 20-19-2w5, is at 3,537 feet and drilling. Foothills Oil & Gas Co.'s No. 1, SW, Section 26-20-3w5, is at 3,498 feet and cleaning out the hole. Foothills No. 2, LSD 8, Section 1-20-3w5, is at 1,905 feet and pulling the 12½-inch casing.

McLeod Oil Co.'s No. 1, LSD 16, Section 1-20-3w5, is at 3,905 feet. The 6-inch casing was cemented in the top of the Madison limestone at 3,855 feet, and after drilling through the cement the test is making new hole some 50 feet in the deep lime. In addition to some 2,500,000 feet of gas from the horizon above the lime coming between the 6-inch and 8-inch, the test has encountered an additional 125,000 feet per day in the lime which is coming up through the 6-inch. It is a close race between McLeod No. 1 and Dalhousie No. 1 as to which will be the next deep test to finish in the Turner Valley. Each test has between 150 and 200 feet of drilling before the potential crude naphtha horizon is reached.

### In Hard Formation

Calmont Oils, LSD 2, Section 1-20-3w5, is drilling in a very hard formation at 5,078 feet. This test is now below the depth, 5,004 feet, at which Vulcan Oils No. 1 got its unexpected production in the Turner Valley syncline. Vulcan Oils' No. 2, LSD 11, Section 13-20-3w5, is drilling in a very hard formation at 4,725 feet. Vulcan No. 1, same LSD, will make another attempt to recover the tools lost in the hole when the well came in at 5,004 feet depth. Vulcan No. 1, which averages around 100 bbls. a day, freezes periodically; and it is thought this will be overcome if the tools are recovered. Spooner Oils' No. 1, LSD 12, Section 13-20-3w5, is at 4,930 feet and still fishing; the lost bit has been loosened sufficiently for grappling.

Stockmen Oils' No. 1, LSD 1-2, Section 27-20-3w5, is still pulling surplus casing; this work will be finished early in March, when the well will be finished as a gasser at 1,760 feet, with a daily production of around 3,000,000 feet of wet gas. When this is done No. 2 test, LSD 7, same section, will start work at once.

Illinois-Alberta Oil & Refining Co.'s No. 1, LSD 14, Section 12-20-3w5, for the week ending February 11, reported a production of 634.4 bbls. of crude naphtha, averaging around 91 bbls. a day. Illinois-Alberta No. 2, same LSD, is reported drilling at 1,558 feet. New McDougall-Segur No. 3, same LSD, is drilling at 870 feet.

Okalta Oils' No. 1 LSD 1, Section 1-20-3w5, is drilling at 4,530 feet, with 8¼-inch casing at 4,500 feet.

### Deepest Hole Progress

British Dominion Oil Development Corp., LSD 4, Section 5-20-2w5, is steadily improving its record as the deepest hole in Canada. At last reports it is drilling at 6,415 feet, with 6-inch casing at 6,367 feet. Open hole will now be drilled as far as possible. It is expected that this test may establish a new deep record for cable tool drilling. The test was started in June, 1926, and has gone steadily ahead since then, with only minor interruptions. The work has been handled throughout by Mart and Millard Hovis; the former was one of the drillers on the Dingman discovery well, now Royalite No. 1, and has had a long experience with the Turner Valley Field. British Dominion No. 1 is located south and east of Royalite No. 4 naphtha gusher, and on the opposite side of Sheep Creek from the big well. Section 5-20-2w5 catacorners with Section 7-20-2w5, in which Royalite No. 4 is located. The British Dominion well is now approximately 3,000 feet below the depth at which the Royalite No. 4 got the top of the limestone, and is apparently still drilling above the Madison, though it is thought to be fairly close to that formation. It is one of a group of four deep tests that happened to be located at an exceptionally low point on the structure; which should make results decidedly interesting if the test can be continued to the same horizon in the Madison as was tapped at the high point on the structure by Royalite No. 4. The deepest producing well in the field is Vulcan No. 1, which got the crude naphtha horizon at 5,004 feet. At this point, in the syncline between the two folds of the Turner Valley structure, the production was still crude naphtha. British Dominion No. 1 is now a great deal deeper than the Vulcan well, and is apparently on the eastern flank of the eastern fold; and is about as far south and east of the Royalite No. 4 gusher as Vulcan No. 1 is north and west. If it is carried to a conclusive depth it should add immensely to the geological information regarding the Turner Valley Field.

In the Highwood district, southern foothills, Imperial Oil, Ltd.'s No. 1 Highwood, LSD 3, Section 36-18-3w5, is at 3,624 feet and still engaged in straightening a crooked hole.

In the Skiff Field, Devenish Petroleum's No. 1, LSD 5, Section 27-5-14w4, is still pumping, but no additional information has been given out as to the production. The well apparently started at 10 bbls. an hour, later clogged with sand and fell off somewhat, and more recently increased its production. A little water seems to be coming with the oil, which apparently helps to clean the sand, and has has brought a considerable increase in production.

### Border Fields

In the Border fields, southern Alberta, Madison Oils, Ltd., of Calgary, has located a test in LSD 8, Section 24-2-2w5, on the Beaver Dome, close to the old Beaver well. The test will be drilled by contract, and is expected to spud in by May 15 at the latest. The old Beaver well was drilled about 1915, when the Calgary operators, following the collapse of the Calgary boom, first transferred their attention to the Sweetgrass area of southern Alberta. A rotary outfit was used and it is claimed this mudded off a fair commercial production at shallow depth. Some oil indications were met at between 1,400 and 1,500 feet, and it is at this depth the Madison Oils, Ltd. is looking for production. The Beaver well had a gas production, claimed to be wet gas, at 1,800 feet, and some of this gas still comes up through the mud and water in the old hole.

In the Turner Valley Field, Seneca Oils, LSD 1, Section 34-20-3w5, is drilling at 3,435 feet.

In the Moose Mountain district, Signal Hill Oil Co.'s No. 2, LSD 9, Section 34-23-5w5, has resumed drilling at 1,825 feet after cementing a 5-foot caving. The bottom of the hole at this depth is in the top of the Blairmore-Dakota formation, where production is looked for.

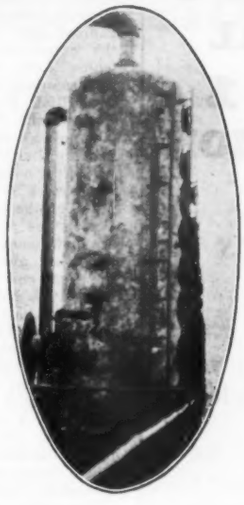
In the Border fields, Gas Production & Transportation, Ltd., NE, Section 21-4-18w4, is at 3,000 feet and fishing for lost underreamer dogs. It is reported that the Canadian Western Natural Gas Co. is doing some further core drilling in the Warner district.

In the area north of Suffield, C. E. Duffield, of Redcliffe, is starting a test for the Toronto-Alberta Oil Development Co. The drilling outfit will be moved to the site as soon as the roads are in shape, and drilling will be started early in the spring.

On the Montana side, the Sunburst Oil & Refining Co. test in the Flat Coulee district has resumed drilling after a shutdown to move the boiler a safe distance back from the gas flow. The test is reported entering the 52-foot sand at the Ellis-Madison contact, where production was looked for. The test has some oil in the 80-foot Baskoo sand at the base of the Kootenay, and 10,000,000 feet of gas with some oil in a 27-foot sand in the Ellis. Day Oil Co., financed by Edmonton men, is planning to drill a test in the Kevin-Sunburst Field. No location has yet been announced. Officers of the company are: S. Victor Day, president; William T. Bowhey, vice president; H. A. McLean, secretary-treasurer, and S. B. Ferris, J. Russell Love, J. F. Babb, W. E. Clark and R. J. Gillis, directors.

### Wainwright Field

In the Wainwright Field, east central Alberta, a Toronto syndicate is reported to be planning a test to be drilled close to the Interior Oil Co.'s test in Section

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***Will it crack? Yes! and No!***

If you put the first coat on ½ in. thick, the second Coat 1 in. thick and finish with ¼ or ½ in., you will not have any cracks, but, if you slap it on 1 and 2 inches first, you will have cracks.

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36-44-7w4. The latter test is shut down at 2,100 feet, with some gas production reported.

It is reported that arrangements have been completed whereby a Vancouver, British Columbia, company, recently organized, will resume the development of the extensive leases of British Petroleums, Ltd., in the Wainwright Field. The company will take over 10,000 acres of British Petroleums' leases in the Wainwright Field in exchange for 50,000 no par shares of its capital stock; while British Petroleums shareholders will have the privilege of exchanging their stock for shares in the new company, at the rate of 10 shares of British Petroleums plus 10 cents for 1 share of the new company. The Vancouver company has also secured some acreage in the south end of the Turner Valley where a test will be drilled; this acreage comprises W half LSD's 10 and 15, Section 20-19-2w5. The Turner Valley test will be started this spring, but plans for development on the Wainwright acreage have not yet been completed.

Apart from a deep test for gas in the Viking Field, no actual development work has yet been officially announced by the Hudson's Bay-Marland Oil Co., which heretofore has confined itself to geological work, and was planning to continue this work on a more extensive basis throughout the coming year, with actual drilling for oil to follow in 1929.

In Manitoba, the Mack Oil & Development Co., LSD 12, Section 30-22-17WPM, in the Ochre River district, is reported drilling at 507 feet. This is the only test at present active in the province of Manitoba. In the same area, a test by the W. J. Holmes Co., in LSD 10, Section 30-22-17WPM, was abandoned some time ago at 1,300 feet.

## SOUNDER THINKING CAN BRING STABILIZATION

(Continued from Page 90)

try to put its economic house in order.

Fortunately, there are indications that the industry is coming to its senses.

Recently the Committee of Nine (including in its membership three of the best lawyers the American Bar Association could select, and three attorneys in government service, one of them a member of the Federal Trade Commission, who was trained in the Department of Justice) said this:

"It seems clear to us that any agreement for the co-operative development and operation of a single pool, even though it involves the control or curtailment of production from that pool, is not a contract or agreement in violation of any anti-trust law, either State or Federal."

If the industry is willing to act on that opinion sincerely and effectively, there is a fair chance of bringing economic order out of chaos in 1928.

Some sacrifices of what seem to be immediate advantages will be inevitable. Co-operation without sacrifice is not co-operation at all. It is merely following the path of immediate self-interest.

No timid or half-hearted co-operation will be sufficient. The industry must have something better than a balance of production and consumption. There must be a substantial draft on stocks which have accumulated far beyond practical needs and are too heavy a financial burden.

I believe the leaders of the industry are thinking along sounder lines than ever before and that they have it in their power to bring the industry back to a profitable basis.

## ADVANCEMENT SHOWN IN REFINERY TECHNOLOGY

(Continued from Page 121)

and will do much more in the immediate future to develop the issue and gives hope for rapid and valuable returns. Three or four regional or sub-committees of the main A.P.I. committee are being organized in the natural geographical divisions of the industry. Development along this line during the past year has not been great, but it is felt that there has been a considerable gain in knowledge regarding the factors involved, some further progress in the production of non-corrosive alloys and protective coatings, and in general a much better ground work prepared for future progress. On the other hand, the need for such knowledge is much greater today, because of the tremendously larger quantities of the more corrosive crude oils being produced now.

The economic pressure which the low price returns from the finished products exerted upon the refiner has not only impelled him to great efforts in the reduction of his processing costs, but also stimulated much greater activity and concentration along the line of conservation of waste and losses. As a result we have a more extended use of floating roofs, insulated tank tops, storage gas systems such as breather bags or gas holders, and pressure storage tanks for the reduction of the waste of light products by evaporation. A new development along this line was the announcement of a flexible roof tank, which created much interest and which may prove of great value in the field of long-time crude storage.

The introduction of the vapor-tight supercentrifuge machine is proving of value in the decreasing of naphtha losses in the manufacture of bright stock. Greater attention to tail-gas recovery systems and distillation has resulted in some savings there.

**Additional Changes**

There has been a substantial increase in the knowledge of the fundamental principles and reactions involved in refining processes. I have already mentioned the extensive work on desulphurization and sweetening of gasoline. There have been similar contributions on every phase of the industry. Leslie and Goode have furnished valuable information on the single and multiple flash distillation of petroleum. There has been valuable new information published on the physical and thermo dynamic data of petroleum products.

Unusual progress has been made in the theoretical considerations of heat flow through thin tubes as well as in the actual application of such principles, and in addition an impetus has been gained along this line which augurs well for future progress.

## SOUTHWEST TEXAS

(Continued from Page 54)

closed. Had several feet of oil in the bottom; No. 53 Benavides, Survey 412, Block 3, located 160 feet to south and east lines, is drilling at 700 feet.

**Luling Field—Caldwell**

Magnolia Petroleum Co.'s No. 8 Mercer, John Henry Survey, is rigging up. Pat M. Armstrong's No 1 Hardeman, Miles G. Dykes Survey, 150 feet to northwest and southwest lines, is drilling at 1,850 feet. North & South's No. 1 Kelly is drilling at 7,491 feet in schist; No. 2 Tiller is drilling at 7,041 feet in schist.

**Dale Field**

The Texas Company's No. 1 Jeff Moore, Jasper Gilbert Survey, 270 varas to northeast lines and 335 varas to northwest lines, at 2,153 feet total depth, in serpentine topped at 2,024 feet is going on the pump.

**Kingsville Field—Kleberg**

Humble Oil & Refining Co.'s No. B-3, Lot 19, Section 38, located 150 feet to CWL, is setting 10-inch casing at 500 feet; No. 5 Kleberg, Lot 8, Section 40, located 150 feet to south and west lines, is in gumbo at 2,350 feet; No. 6 Kleberg, Lot 1, Section 40, located 450 feet to north line and 150 feet to east line, is drilling in gumbo at 1,685 feet.

**Adams Gas Field—Medina**

C. E. Lange and Jake Jarmon's No. 1 Adams, Survey 71, located 500 feet to north and west lines, shut down at 60 feet since November is preparing to resume drilling.

**Saxet Field—Nueces**

Alamo Drilling & Leasing Co.'s No. 1 Gallagher, Survey 158, located 1,215 feet to north line and 650 feet to east line, is shut down at 150 feet.

**Refugio Field—Refugio**

Houston Oil Co.'s No. 1 Rooke is drilling at 3,000 feet; No. 6 Rooke is drilling at 3,000 feet; No. 11 W. J. J. Heard is setting casing at 3,290 feet. Houston Gulf Gas Co.'s No. 2 Shelly is at 3,30[illegible] feet waiting on casing; No. 5 W. Heard is drilling at 3,000 feet; No. 2 Ryan at 3,300 feet approximate depth is drilling in; No. 1 Vance at 3,600 feet missed the 3,300-foot sand and is standing. Saxet Oil Co.'s No. 1 Wilson Heard is moving in machinery (number changed from No. 1 Heard to No. A-6 Heard). George Williams' No. 1 Terrell, Martin Powers Survey, 6 miles southwest of Refugio, is drilling at 1,925 feet.

**White Point Gas Field—San Patricio**

Alamo Drilling & Leasing Co.'s No. 1 Hunter is rigging up. Houston Oil Co.'s No. 3 Humble is rigged up; No. 4 Humble is drilling at 2,306 feet; No. 5 Humble fee is location; No. 2 Ragsdale, deep test is shut down at 4,391 feet for repairs; No. 3 Ragsdale is location. Saxet Oil Co.'s No. 1 White Point Development Co. is drilling at 1,950 feet after encountering considerable gas at 1,900 feet; No. 1 Hunter is erecting derrick.

## SOUTHWEST WILDCATS

(Continued from Page 54)

not abandon No. 7 Walsh on the Piedras Pintas salt dome in Duval County at 4,505 feet as first reported. The company is fishing the tools out of the hole and if this is successful will drill the hole deeper. It had a sand at the present depth but it tested salt water.

**Duval County**

National Oil Co.'s No. 1 Ball, Survey 16, located 450 feet to north line and 150 feet to east line, is at 1,078 feet and putting in new boiler. Houston Oil Co.'s No. 1 Woods-Welder, Survey 233, located 1,750 feet to west line and 100 feet to north line, is drilling at 450 feet.

**Hidalgo County**

D. L. Smith Oil Co.'s No. 15 Fernandez, Porcion 46, Block 34, is drilling at 3,240 feet.

**Jim Hogg County**

M. I. Shaw and others' No. 1 Jones, Survey 381, Block 12, located 171 feet to south line and 486 feet to west line, at 1,850 feet is drilling in shale after sand at 1,654 feet tested dry.

**Starr County**

The Texas Company's No. 1 M. Guerra, Porcion 68, Block 91, is moving on; No. 1-A V. Guerra, Porcion 68, Block 92, is location. Kusch Exploration Co.'s No. 1 Frank Doyno and others, Porcion 73, Block 13, is drilling in hard rock at 650 feet. Clark & Woodruff's No. 1 Kelsey, Porcions 75, 76, 77, at 568 feet is fishing for bailer. J. E. Harson's No. 1 H. Guerra, Survey 43, located 660 feet to south line and 1,320 feet to east line, is shut down at 1,120 feet. Deckle & McCarley's No. 1 Garcia, Survey 918, located 150 feet to south and west lines, is preparing to resume at 1,098 feet.

**Bexar County**

Allen Burnam's No. 1 Ward, southwest of Martinez in the A. A. Gardiner Survey, is drilling at approximately 1,000 feet. Larsen-Walsh and others' No. 1 Oppenheimer, William Miller Survey No. 180, about 18 miles southwest of San Antonio, is through rock at 100 feet.

**Bastrop County**

Mrs. McMurtray's No. 1 B. L. Duran, L. Flint Survey, located 150 feet to northwest lines and 900 feet to southwest lines, is drilling at 2,461 feet. Noack & Laing's No. 1 Roemer, Isaac Casner League, is shut down at 1,935 feet. James O'Hara is preparing to resume drilling at 1,950 feet in the old Pritchett well. B. W. Owens' No. 1 Ed Jones, 150 feet to north and east lines of 34.5-acre tract, is rigging up.

**Bee County**

D. Hewitt's No. 1 G. A. Ray, northeast of Pettus, has moved on heavy machinery at 2,303 feet; No. 1 Schultz is drilling at 650 feet. Red Ant Oil & Gas Co.'s No. 1 Perry & Chesnut, B. Q. Hadley Survey, west of Pettus, has been temporarily abandoned at around 1,000 feet.

**Blanco County**

C. W. Bates' No. 1 Herman Massey, Henry Manton Survey, 920 feet to north line and 660 feet to east line of survey, is at 75 feet changing to bigger walking beam. Robert A. Rodson's No. 1 Glass

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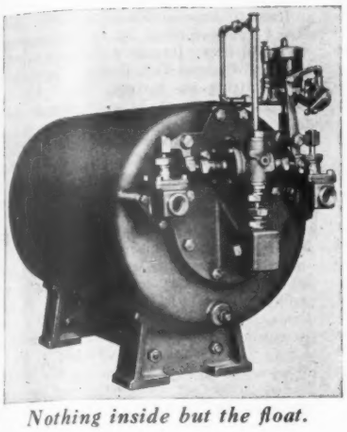

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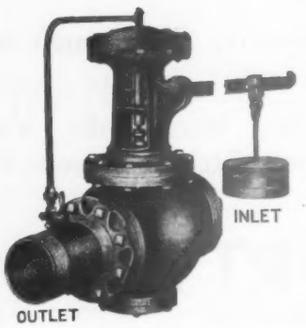


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cock, Survey 50, located 150 feet to center east line, is drilling at 390 feet.

**Caldwell County**

Lu-Tex Oil Co.'s No. 1 Wilson, A. Floyd Survey, 2,320 feet to east line and 200 feet to south line, has set surface casing at 40 feet. H. C. Ratcliffe's No. 1 Briscoe, J. Hindes Survey, center, is rigging up; No. 1 J. L. New, J. Hindes Survey, 150 feet to west line and 600 feet to south line, is shut down at 2,914 feet.

**De Witt County**

Durbin Oil Co.'s No. 1 Gohmert, G. W. Brooks League, 175 feet to north line and 300 feet to east line, is on rock at 2,374 feet. H. T. Roe's No. 1 Lienhard, D. J. Bibb Survey, SW cor., is shut down at 950 feet.

**Dimmitt County**

Humble Oil & Refining Co.'s No. 1 City National Bank, Survey 654, located 700 feet to north line and 2,000 feet to east line, at 5,004 feet bailed dry, shot casing at 2,600 feet with two sticks of dynamite and again bailed dry; shot casing at 1,455-85 feet and it came in for 2,000,000 or 3,000,000 feet of gas and 500 bbls. of salt water a day, has been mudded off and is waiting on orders.

**Edwards County**

Devil's River Oil Co.'s No. 2 Turney, C.C.S.D.&R.G.N.G., Section 167, located 2,040 feet to north line and 660 feet to west line, is shut down at 440 feet with oil showing at 390 feet.

**Frio County**

Karnes and others' No. 1 J. J. Little is shut down at 607 feet, due to litigation. F. A. Lain's No. 1 Edwards, Hooper & Wade Survey, 920 feet to center north line, at 1,250 feet is preparing on resuming drilling.

**Fayette County**

National Oil Co.'s No. 1 J. C. Melcher, S. M. Williams League No. 1, located 300 feet to north and east lines, is moving in the machinery. Williams & Phalon's No. 1 Cervenka, F.C.S.L., Block 97, has derrick up and rig on ground.

**Goliad County**

C. W. Simpson's No. 1 Ideus, W. H. Pendleton Survey, 146 feet to north line and 540 feet to west line of lease, is shut down at 2,323 feet.

**Gonzales County**

W. D. Flynn's No. 1 Wilhausen, S. Bateman Survey, east central part of the lease, is drilling at 800 feet. Green & Shall's No. 2 Dubose, J. Pratt Survey, 350 varas to center south line, is shut down at 2,700 feet for fuel. L. L. Jones and others' No. 1 Campbell, Moore & Bridges Survey, is shut down at 1,980 feet. W. G. Malone's No. 1 Mrs. D. G. Staton, 3½ miles south of Slayden, is drilling water well. L. P. Unkel's No. 2 Johnson in the shallow Slayden Field, a deep test, is drilling in gumbo at 1,000 feet.

**Guadalupe County**

O. W. Killam's No. 1 J. W. Calvert, Fulcher Survey, 110 feet to north line and 1,250 feet to west line, is drilling at 1,865 feet in Buda lime with Austin chalk from 1,600-1,813 feet.

**Hays County**

Orren Estess and H. J. Moore's No. 1 C. N. Sledge, Hinton & Jones Survey, has derrick up and rig on ground. J. E. Rodgers' No. 1 Hohenburg, 2½ miles east of San Marcos, is preparing to make a test at 2,189 feet.

**Jackson County**

J. B. Douglas' No. 1 C. O. Lowrance, 12 miles northwest of Edna, has derrick up.

**Karnes County**

Reynosa Oil Corp.'s No. 2 Butler, Block 43, located 1,000 feet south of No. 1, is fishing at 2,070 feet.

**Kerr County**

Walker-Van Duyn's No. 1 Barfield, B. B. Peck Survey, 4,700 feet to north line and 450 feet to east line, is underreaming at 2,010 feet.

**Live Oak County**

War. Wood Hunt's No. 1 McNeil, Jane Curry Survey, 4,000 feet to northeast corner and 3,000 feet to northwest lines, is drilling at 2,050 feet.

**Medina County**

Pat M. Armstrong's No. 1 Mangold, Survey 62, located 200 feet to south and east lines, is drilling at 700 feet. Chacon Oil Co.'s No. 2 Jungman, Survey 31, located 1,500 feet to east line and 500 feet to south line, is standing at 1,675 feet. Morgan-Walsh's No. 1 Haby, Survey 50½, located 330 feet to west line and 600 feet to south line, is waiting on surface casing.

**Maverick County**

Ryan Consolidated Petroleum Co.'s No. 1 Indio, Survey 14, is setting casing at 4,270 feet. Rycade Oil Corp.'s No. 1 Chittim, Section 129, Block 7, is at 4,295 feet waiting on water; No. 2 Chittim, Section 158, Block 7, is drilling at 3,890 feet.

**McMullen County**

Houston Gulf Gas Co.'s No. 1 Lark O'Boyle Survey, is shut down temporarily at 1,500 feet.

**San Patricio County**

Ed Leach's No. 2 Collins, Edwards-McGloin Survey, SE Section 39 and a few miles northwest of Mathis, at 2,340 feet is setting casing; test showed good gas well. National Oil Co.'s No. 1 J. E. Sullivan, J. C. McMullen Survey, 500 feet to southwest corner, is drilling again at 1,805 feet. George B. Pickett's No. 1 Whitworth, NW NW Section 60, is drilling at 2,600 feet; No. 1 Garrett is standing at 3,030 feet. John Sigmund's No. 10 well has resumed drilling after setting and cementing surface casing.

**Travis County**

C. and R. Smith & Clark's No. 1 Otto Schreiver, J. B. Hurd Survey, 1,120 feet to northwest lines of survey and 150 feet to northeast lines, is drilling at 325 feet. T. P. Garrett's No. 1 Rowe, R. Hornsby Survey, 900 feet to north and east lines, is drilling at 1,000 feet in lime with hole caving.

**Uvalde County**

Pure Oil Co.'s No. 1 J. D. Smythe, Survey 687, located 740 feet to north line and 146 feet to east lines, is underreaming at 1,678 feet.

**Victoria County**

J. J. Elam's No. 1 Vol Kutchka, 200 feet to CNL Section 40, is shut down at 1,000 feet waiting on drill stem. Humble Oil & Refining Co.'s No. 1 Jaeggli is drilling at 595 feet; No. 1 Welder is drilling at 1,163 feet in gumbo.

**Val Verde County**

Magnolia Petroleum Co.'s No. 1 Whitehead, Survey 81, Block D, is drilling at 6,115 feet. O. O. Owens and others' No. 1 Mills, Section 128, Block 1, is shut down at 4,210 feet. W. V. Traves' No. 1 Wilson, Section 115, Block E, is shut down at 905 feet.

**Zavala County**

Witherspoon Oil Co.'s No. 1 West, located 200 feet northeast of the old Sun well that made gas, is drilling at 210 feet.

## CALIFORNIA FIELDS

(Continued from Page 64)

Field when No. 2 Bryant was returned to production flowing 1,625 bbls. of clean 24.4 gravity oil after being plugged back from 4,490 feet to 4,355 feet. The Standard finished a new well in the Inglewood Field early in the week when No. 55 on Los Angeles Investment Lease No. 2 was put on the beam at 2,332 feet. It registered an initial pumping of 392 bbls. the oil testing 19.4 degres and showing 4 cut of 2 per cent.

**Ventura Avenue**

The Shell added two new wells in the Ventura Avenue Field, both being located on the Edison lease. No. 20, a direct offset to No. 1 Willett of the Petroleum Securities, completed early in the week, came in under a natural flow and has been holding up steadily at 1,985 bbls. for several days, the pressure remaining almost constant at 1,0[illegible] pounds. The Shell carried this well to 6,822 feet and finished it with a 5¾-inch combination string carrying 1,100 feet of 100-mesh perforated casing No. 16 Edison, finished late yesterday afternoon, flowing at the rate of 1,750 bbls. per day but may increase after the well has cleaned itself out. This project was drilled to 6,717 feet and finished with a 6⅝-inch oil string carrying 1,025 feet of 100-mesh screen. In addition to the production of crude, Nos. 16 and 20 are each making a little less than 2,000,000 f[illegible]

of wet gas daily. The Shell will probably finish three or four other wells in this field within 30 days unless drilling operations are curtailed as a result of the concerted effort being made to reduce the excessive production of oil and gas. The Associated and Petroleum Securities should also complete several new wells within a month or two if drilling operations continue uninterrupted.

The Associated killed No. 1 Dabney-Lloyd, its record well, recently finished at 7,032 feet, and an attempt will be made to stimulate production by removing a serious impediment. This well failed to respond with the production expected, due to mechanical trouble, and while it resulted in commercial production it may never pay out unless the hole can be cleared and the existing mechanical difficulty corrected. The casing collapsed in this hole just previous to completion a few weeks ago and it may be necessary to sidetrack and drill past the lower several hundred feet of the oil string. This may prove difficult in view of the fact that several hundred feet of pipe have already been sidetracked a short distance off bottom. The Associated's next completion at Ventura Avenue should be No. 102 Lloyd, although No. 51 on the same property is also scheduled for early completion and may precede the former. The Petroleum Securities is expecting increased production as a result of the scheduled completion of No. 3 Willett, a new well, and No. 1 Orton, which is being redrilled and deepened. The Bolsa Chica is making preparations to redrill and deepen its No. 3 Hartman to 7,100 feet. This well, which was put on temporary production several weeks ago, with the drill stem in the hole because of the tremendous gas pressure encountered, will be completed mechanically correct and returned to production. The decision to redrill and deepen this project is a wise one and satisfactory production should be secured as the Shell's No. 19 Edison, a short distance away, has built up to 1,550 bbls. per day from the 7,100-foot level.

### Rincon

The failure of operators to develop commercial production in the upper part of the State zone at Rincon has resulted in a general move to pass up this sand and make a bid for production in the lower part of this same horizon. The series of tests under way in the Rincon Field for several weeks has changed the original policy of producing from the upper 100 feet of sand and operators will endeavor to produce from the lower section and case off the upper part. Ten drilling projects in this field are below the 2,800-foot level and practically all will try out the 3,000-foot horizon. The Pan American did not experience much success with this 3,000-foot zone as its No. 2 State was good for only 175 bbls. daily from 3,097 feet. Development work in this field has been highly unsatisfactory and if it were not for existing excess production of crude and surplus production of natural gas it is a foregone conclusion operators would be making a bid for production in the projected deep zone expected to occur below the 4,000-foot level. The General Petroleum concluded a water pressure test of its newly constructed 10-mile pipe line from the Rincon Field to Ventura a few days ago and this 8-inch welded line is ready as soon as sufficient production is available to warrant continuous operation.

### Kern River

Seven new wells were chalked up along the West Front of the Kern River Field and unless the contemplated restriction in drilling operations becomes effective a number of additional completions can be anticipated, as there are something like 15 drilling projects within a few hundred feet of completion and these should be tanking oil within three weeks. The General Petroleum has just finished two new producers on the Sill property in Section 26-28-27, No. 5 being listed as a 150-bbl. pumper from 2,176 feet, while No. 32 was brought in pumping 115 bbls. daily from 2,105 feet. The Associated brought in No. 3 in Section 23-28-27 as a 210-bbl. pumper from 2,383 feet, the hole having been finished with an 8¼-inch oil string carrying 182 feet of perforated. Nos. 4 and 53 in the same section should also be finished within 10 days if drilling is continuous. George F. Getty got a 248-bbl. pumper upon completion of No. 4 McDougall at 2,168 feet, the oil testing 15 8 degrees and showing a cut of 3 per cent. No. 7 McDougall followed this well into production a few days later making 231 bbls. daily from 2,139 feet, the hole being finished with an 8¼-inch liner. The Petroleum Securities has just finished No. 12 Robinson at 2,437 feet and this well is pumping 182 bbls. of 15.4 gravity oil daily. Nos. 11 and 13 on the same lease are scheduled for early completion. The Standard brought in No. 15 in Section 27-28-27, but showed an initial pumping of only 62 bbls. daily from the 2,360-foot level. The Bishop Oil Corp., California Star, Chanslor-Canfield Midway Oil Co. and General Petroleum should each finish at least one new well within 10 days if drilling operations continue uninterrupted.

### Midway-Sunset

The Standard's No. 52 in Section 29-31-24, a 400-bbl. well drilled to 4,580 feet and finished with a 6⅝-inch oil string, was the only successful completion in the Midway-Sunset Field and although drilling operations have been reduced to an absolute minimum additional wells will be spudded in from time to time due to lease obligations. The North American and Honolulu Consolidated are each working on one drilling project in the Midway Field and since both wells are in proven territory and within 1,000 feet of completion they should be tanking oil within 30 days. The Union and Standard are each working on one deep project out in the Maricopa Flats, the former's No. 3 Houchin, a new well in Section 10-11-23, rotating ahead at 5,425 feet, and the Standard's No. 4 Rass making hole at 5,439 feet. The Berry Oil Co., under the supervision of Clarence Berry, has taken over the property holdings and equipment of the Carneros Oil Co. in the Belridge Field and an active development program is contemplated. The Berry interests have just taken over possession of the property, which is in Section 30-28-21, and preparations are being made to bring in No. 44, a recent spud. The Standard has just finished its No. 32 in Section 27-11-20 in the Wheeler Ridge Field at an even 3,000 feet, the initial production being 75 bbls. of 22.1 gravity oil daily. D. W. Waltman, representing a number of French clients, has just completed a new well in the McKittrick Field and preparations are being made to start another. The new well was No. 8 in Section 8-30-22, the initial production being 142 bbls. of 15.1 gravity oil daily. The operators finished a big gas well later in 1927 which is furnishing boiler fuel in addition to commercial deliveries. The daily crude oil production of this lease is a little better than 350 bbls.

### Northern California Wildcats

With the Pacific Eastern's well at Fruitvale pumping at the rate of approximately 200 bbls. per day, operators are speculating whether the Pacific Eastern has opened up two new fields or whether the company's Fruitvale well is on one end of a single structure with the Union Avenue wildcat, 5 miles southeast, on the other. The status of this area will not be determined until additional work is undertaken and a permit was granted a few days ago by the Bakersfield City Council for a new wildcat to be located approximately 4 miles east of the Pacific Eastern's discovery well at Fruitvale and about 3 miles north of the company's two wells in the Union Avenue south of Bakersfield. These three locations form a triangle and with oil already developed at two points operators will watch developments in the third. Jackson & Chamberlain, the contractors who will drill this new wildcat, the first within the corporate limits of Bakersfield, expect to get under way soon. The test is to be a relatively shallow one and light portable equipment is being used. The Pacific Eastern is plugging back its initial test in the Union Avenue area and the several stringers picked

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up between 5,100 feet and 5,225 feet will be tested out.

The movement to curtail every barrel of heavy oil production will undoubtedly have a very depressing effect on wildcat operations in areas which might be expected to yield a heavy gravity oil. The Edison district, opened up a few weeks ago by the General Petroleum, is in this classification and while the General Petroleum will continue its exploration work, additional drilling will be retarded until conditions improve. The Richfield Oil Co. recently concluded a deal with the Kerwin interests whereby that company will acquire approximately 3,000 acres in the Edison district, 7 miles southeast of Bakersfield, and some additional holdings in the Semitropic area northwest of Fruitvale in the vicinity of Wasco. The Richfield has taken over the entire holdings of the Kerwin interests at Edison, which includes a 50 per cent working agreement in 800 acres operated by the General Petroleum upon which this concern recently finished No. 1 Kerwin, a 150-bbl. pumper of heavy oil, but there is no obligation to undertake any development work at present. In addition the Richfield acquires a full interest in a 400-acre tract adjoining the General Petroleum's acreage. At Semitropic the Richfield takes possession of 2,000 acres, upon which the Doheny-Stone Drilling Co. has been working for several weeks. Development work in the Fruitvale area where the Pacific Eastern recently completed a well yielding a 25 gravity oil will probably pick up, in fact the Brownmoor Oil Co. and the Belridge Oil Co. are both expected to initiate new work.

The Bolsa Chica Oil Co. is making preparations to resume drilling operations in the Kettleman Hills area of Kings County where small shallow production of heavy oil is obtainable around the 2,200-foot level. The Bolsa Chica's lease adjoins the Burbank property of the General Petroleum on which small unsatisfactory production of heavy oil was secured. Both wells were drilled below the 3,000-foot level and it is the intention of the Bolsa Chica to plug back before going any deeper. The General Petroleum will probably drill another test on the Burbank lease, probably carried to around the 5,000-foot level before abandonment.

**Southern California Wildcats**

The Potrero district is about the only area in southern California showing any developments of importance. Smith-Carpenter's No. 1 Smith, originally started by the Julian Petroleum, is making a little better than 1,000,000 feet of gas daily according to actual meter readings of the Southern California Gas Co. The well is not making any oil and none is anticipated as the gas is accompanied by about 500 bbls. of salt water every 24 hours. The California Well Drilling Co. contemplates a resumption of work on the old 7,060-foot duster drilled on the Del Amo property near Davidson City a year or so ago and material will be moved in shortly if a definite decision is made. The Southern California Drilling Co. is also making preparations to resume work on a suspended project. This concern will redrill and deepen No. 1 Mattison in the El Segundo area which was carried down and suspended at 4,864 feet.

## LOUISIANA-ARKANSAS

(Continued from Page 97)

tion 36-23-12, is going deeper after testing 4,000,000 feet of gas at 3,079 feet. Woodley & Collins' No. 1 Bain, Section 31-23-12, is in shale at 3,000 feet; No. 1 Bolinger, Section 36-23-12, cemented 8-inch at 806 feet and is drilling at 3,050 feet.

Elm Grove and Sligo—C. F. Davis' No. 5 Simpson, Section 14-16-12, is drilling at 2,230 feet. Ellis & Markley are down 1,360 feet with No. 5 Hunter, Section 14-16-12. Goodwin got salt water at 1,800 feet in No. 1 Mercer, Section 21-16-12, and is arranging to retest. J. S. McCullough is setting 6-inch casing at 1,542 feet on No. 6 Hodges, Section 25-16-12. R. O. Roy is drilling No. 7 Caplis, Section 25-16-12, at 325 feet.

**Caddo Parish**

Greenwood—Belchic & Laskey's No. 4 Sharp, Section 10-18-16, is shut down at 1,159 feet. Magnolia Petroleum Co. is coring at 1,228 feet on No. 2 Bell, Section 4-17-16; No. 1 J. W. Furrh, Section 28-18-16, cored shale at 2,728 feet.

Pine Island—Dixie Oil Co.'s No. 81 Dillon, Section 13-21-15, is drilling lime at 4,007 feet; No. 92 Dillon, Section 13-21-15, is in lime at 4,020 feet and No. 4 H. H. Huckaby, Section 11-21-15, is in sandy shale at 3,951 feet. Magnolia Petroleum Co.'s No. 8-A Hampton, Section 15-21-15, is in lime at 3,915 feet; No. 22 Robertshaw, Section 23-21-15, is in sandy shale at 3,880 feet. D. C. Richardson estate's No. 6 Youree-Randolph, Section 13-20-15, is drilling at 2,200 feet. The Texas Company is arranging to put No. 9 A. Herndon, Section 14-21-15, on the air, total depth 3,907 feet; No. 13-B Noel, Section 14-21-15, is running 2-inch tubing, total depth 3,979 feet.

**LaSalle Parish**

Urania—W. D. Wingfield and others, who abandoned No. 2 Gibson, Section 2-9-1e, last week, have set 10-inch surface casing in No. 3 at 103 feet. Location is 330 feet north and east SW cor. SW SE, Section 2-9-1e.

**Monroe District**

Morehouse Parish—Elbert Petroleum Co. began drilling No. 1 Morehouse Planting Co., Section 40-19-7, February 16, set 10-inch casing at 188 feet and is drilling at 760 feet. Moody-Seagraves' No. 1 Wolf & McInnis, Section 13-20-4, set 775 feet of 8-inch casing and is drilling at 2,000 feet. The Texas Company's No. 1 Myers, Section 15-22-7, is drilling at 2,285 feet. United Carbon Co.'s No. 1 Bastrop Pulp & Paper Co., 660 feet north and east SW cor. SE, Section 18-21-6, began drilling February 19, and is down around 200 feet.

Ouachita Parish—Imperial Oil & Gas Products Co.'s No. 5 Stubbs, Section 13-19-3, set 12-inch surface casing at 190 feet and 8-inch at 808 feet. Jordan Drilling Co.'s No. 2 McGee, Section 10-18-4, has 6-inch cemented at 2,167 feet. Ouachita Natural Gas Co. has derrick up for No. 9 Smith, 230 feet north and 25 feet east SW cor., Section 38. Palmer Corp. cemented 6-inch casing at 2,116 feet on No. 2 Central Real Estate, Section 1-19-4. Peerless Carbon Co. cemented 2,123 feet of 6-inch casing in No. 3 Moore, Section 49-20-4. United Carbon Co.'s No. 2 Nelson fee, Section 6-19-5, is drilling at 1,950 feet and J. P. White has rig up for No. 1 Schmidt, Section 3-15-4.

Union Parish—Barbour Oil Co. is coring No. 1 Tugwell, Section 21-22-5, at 2,280 feet. Carter & Goodwin's No. 1 Hudson, Section 7-23-1e, is shut down for fuel at 102 feet. Industrial Gas Co.'s No. 2 Hill, Section 9-20-3, is drilling at 600 feet. Natural Gas & Fuel Co. had a small show of gas at 2,214 feet in No. 1 Waldrop, Section 7-21-3, and is fishing for drill stem. John Potts' No. 1 Bernstein, Section 30-20-4, is drilling 6-inch plug at 2,105 feet. Ruston Drilling Co., cemented 6-inch at 2,167 feet on No. 1 Steel, Section 36-20-3.

**Sabine Parish**

Pleasant Hill—Ruffin and others cemented 6⅝-inch casing at 3,151 feet on No. 1 McElroy, Section 33-10-12.

**Richland Parish**

Gulf Refining Co.'s No. 3 Rhymes, Section 28-17-6, is in shale at 2,157 feet. Moody & Seagraves began drilling No. 1-A Sartor, Section 8-16-6, February 19 and have 15½-inch casing set at 148 feet; No. 1-C Sartor, Section 17-16-6, is drilling at 596 feet with 15½-inch casing set at 136 feet. Natural Gas & Fuel Corp.'s 2-C Thompson, Section 21-16-6, formerly No. 2-A Thompson is skidding derrick to start new hole after a blowout at 290 feet; No. 3-C, formerly No. 3-A Thompson, in the same section, is drilling at 400 feet with 15½-inch cemented at 180 feet. These two wells are relief wells to kill No. 1-A Thompson in the same section which cratered after completion two or three weeks ago. Southern Carbon Co.'s No. 2 Sartor, Section 20-16-6, has cemented 6-inch casing at 2,280 feet; No. 1 Span, Section 8-16-6, is drilling at 2,278 feet. United Carbon Co.'s No. 1 Mulhern, Section 20-16-6, is drilling at 2,387 feet.

**Webster Parish**

Cotton Valley—Humble Oil & Refining Co. has derrick up for No. 2 Webb, 1,980 feet north and east SW cor., Section 14-21-10. C. H. Lyons and others cemented 6⅝-inch casing at 2,650 feet on No. 1 Sexton, Section 36-21-10. Magnolia Petroleum Co. is waiting for 6⅝-inch casing to be set at 4,340 feet on No. 1 G. W. Cole, Section 27-21-10; also with No. 1 D. G. Cox, Section 22-21-10, total depth 4,309 feet; No. 1 J. M. Mixon, Section 22-21-10, is drilling lime at 4,151 feet. Ohio Oil Co.'s No. 38 Bodcaw, Section 15-21-10, cemented 6⅝-inch casing at 4,250 feet; No. 2 Crichton, Section 21-21-10, is drilling lime and shale at 4,049 feet.

Sarepta and Shongaloo—C. H. Lyons and others' No. 1 Porter-Wadley, Section 36-23-10, is drilling at 2,150 feet. Magnolia Petroleum Co. tested 3,000,000 feet of gas at 2,969 feet but will go deeper; No. 1 R. J. Munn, Section 29-23-9, is drilling at 1,051 feet.

**ARKANSAS**

**Nevada County**

Autrey Oil Co. is drilling No. 1-F J. Haynie, 150 feet south and east NW cor. SW SW, Section 6-14-20, at around 150 feet.

**Ouachita County**

Smackover—Little Fay Oil Co.'s No. 4 Robertson, Section 25-15-16, is arranging to set 6⅝-inch casing at 2,005 feet. Ohio Oil Co.'s No. 7 Cramer, Section 22-15-16, is drilling at 1,450 feet.

**Union County**

El Dorado—Grimes Brothers are rigging up to drill No. 2 Hill, Section 7-18-14. Mellor and others have rig up to drill No. 1 Van Hook, Section 7-18-14. Mountz and others' No. 6 Pratt, Section 8-18-15, is drilling at 2,150 feet.

Champagnolle—Eddie Jones has temporarily abandoned No. 4 Crain, Section 2-17-14, total depth 3,067 feet, changing his plans to put it on the air with 2,000 feet of fluid 50 per cent water, standing in the hole. He has made location for No. 1 Stegall, 320 feet south and west NE cor. SE SE, Section 2-17-14. Oilwell Corp. shot No. 1 Dumas, Section 11-17-14, with 5 quarts of nitro at 3,099 feet but without results. Pure Oil Co. got an estimated 7,000,000 feet of gas and a slight show of oil in 7 feet of sand, total depth 2,726 feet in No. 1 Gregory, Section 10-17-14, and is reaming to bottom. Oilwell Corp.'s No. 1 Townsend, Section 10-17-14, is waiting for cement to set after cementing back from 3,047 to 2,600 feet for another test of 6 feet of sand at 2,740-46 feet which showed for 5,000,000 feet of gas and 200 bbls. salt water. Rushing and others tested salt water at 2,740 feet in No. 1 E. F. Gregory, Section 11-17-14, and are pulling liner to core and go deeper. Simmerall and others tested salt water at 2,710 feet in No. 1 Finley, drilled through salt water at 2,915-19 feet and cored red beds at 2,948 feet.

**EAST TEXAS**

**Harrison County**

State Line Oil & Gas Co.'s No. 1 Waterman in the E. Pollock Survey, is drilling gumbo at 2,918 feet; Tylong Oil & Gas Co. cemented 6-inch casing at 1,957 feet on No. 1 Armstrong in the Simpson Holloway Survey, total depth 1,984 feet.

**Panola County**

S. H. Gardner and others are drilling at 650 feet on No. 1 Cavin, 5,807 feet south and 2,663 feet east NW cor. B. C. Jordan Survey, on which they began work February 16. Magnolia Petroleum Co. cored lime and shale at 2,258 feet in No. 14 C. G. Steel in the B. C. Jordan Survey; No. 1 E. C. Tillery in the Jane Thorp Survey, is drilling gummy shale at 2,190 feet; No. 1 Leigh Trosper, B. Stevenson Survey, cemented 6-inch casing at 1,936 feet and is arranging to test, total depth 1,943 feet. The Texas Company began drilling No. 8-B Adams, 2,010 feet west and 660 feet south NE cor. Isom Hatcher Survey, February 10, set 10-inch casing at 40 feet and is arranging to set 6-inch at 1,010 feet. D. Thomason's No. 3 Crenshaw in the John Womack Survey, is drilling at 2,150 feet.

**Shelby County**

Magnolia Petroleum Co. cored hard shale at 3,780 feet in No. 1 Pickering Lumber Co. in the W. J. Crane Survey.

## LA.-ARK. WILDCATS

(Continued from Page 97)

are planning a 3,500-foot test on a block of 3,500 acres in the W half SW, Township 9, Range 13, and in Winn Parish Grier and others have a block of 3,000 acres between Winnfield and Dodson on which they plan a 2,500-foot test. Grier and Gault drilled in this locality a year ago and got showings between 700 and 800 feet and again at around 1,200 feet that warrant another test. Ohio Oil Co.'s No. 2 Rolen Acct. 1 in Section 5-12-1w, Winn Parish, on the Sikes Dome, was dry at 4,454 feet but will be drilled to 6,500 feet if necessary to accomplish a thorough test of the possibilities of this dome. It is the company's fifth and deepest test on this dome, only one of which has produced, supplying about 100,000 feet of gas per day which is used for fuel for the present undertaking.

Chapperall Oil Co. of Fort Worth, Tex., is reported to have taken over the old Cathcart Oil Co.'s No. 1 Holt in the W. F. Moore Survey around which it has a 5,000-acre block. The well is reported standing 2,500 feet in oil, total depth 3,020 feet and it is planned trying to make it produce and, failing that, drilling a new test.

There was some interest early in the week in Natural Gas & Fuel Corp.'s No. 1 Waldorp, Section 7-21-3e, Union Parish, following a show of gas at 2,214 feet, but it failed to make good and now they are fishing for drill stem. Location is about 7 miles northwest of production in the Monroe gas field.

Gulf Refining Co.'s No. 1 Ches Wymond in Section 20-18-6, about 7 to 10 miles north of production in the main body of the Richland Parish gas field, is drilling in a hard sand at 2,391 feet after testing salt water a few feet higher.

Local citizens are understood to be back of a wildcat to be drilled on the Gantt land in Section 12-17-22, Columbia County by George Dawley and others who have derrick up.

There were but two wildcat completions in this territory during the week. Foster and others tested dry at 3,210 feet on No. 1 Johnson, Section 7-10-13, DeSoto Parish, about 3½ miles southwest of Benson Oil Co.'s No. 1 Wolf, a 40 bbls. initial producer at 3,012 feet in Section 3-10-13. Pitcher and others' second wildcat in Union County, Arkansas, No. 1 Arkansas Timber Co., in Section 21-17-11, second hole, was dry at 3,107 feet. No showings of either oil or gas were obtained in either the first or second hole on this location, several miles east and a little south of the current Champagnolle activity.

## Mississippi

Mississippi activities appear to have quieted down considerably in the past few weeks with most of the individual operators trying to finance new tests or refinance old ones that have been shut down for varying lengths of time. Since salt water was found at 3,137 feet in the Bassfield well, Cherokee Petroleum Co.'s No. 1 Burkett, Section 14-6-18, Jeff Davis County, nothing has been heard from it. The Texas Company and Transcontinental Oil Co. have landed 8¼-inch casing at around 2,300 feet and cut off the small amount of water that showed in No. 1 Day, Section 18-16-18, Monroe County, and at last report the bottom was in a hard white sand at 2,420 feet. Moody & Seagraves are reported arranging to go deeper with No. 1 Whitesides, Section 16-9-7, Lee County, which was temporarily abandoned at 2,850 feet, a few feet below contract depth, two or three weeks ago. A. M. Sutton's No. 1 Acker, Section 25-13-19, Monroe County, is shut down waiting for cement to set after cementing back from 674 feet to cut off an artesian flow.

**NORTH LOUISIANA**

**Bienville Parish**

Edwin J. Forrest's No. 1 Perritt, Sec-

tion 11-17-6, is shut down waiting orders after a test showed only salt water in 10 feet of sand, total depth 3,003 feet. Humble Oil & Refining Co. has rig up for No. 1 Anderson, 660 feet north and west of SE cor. Section 29-18-5.

**Bossier Parish**

H. S. Goodwin's No. 2 Curtis, Section 36-17-13, is drilling at 2,135 feet.

**Caddo Parish**

Greenwood Production Co. has fished lost drill stem out of No. 1 Cooper & Ellerbe, Section 15-18-14, and the rig is shut down waiting orders, total depth 3,234 feet. Simmons & Harell have started a new wildcat on the Mattie Myer plantation just beyond the southern boundary of Shreveport and have rig up 2,400 feet south and 950 feet east of NW cor. Section 21-17-13. Tubbs and others' No. 1 Hines, Section 9-14-16, is shut down at 2,730 feet.

**Catahoula Parish**

Leonard Petroleum Co. has rig up for No. 1 Knott, Section 32-11-8. Lochnager Oil & Gas Co. is drilling No. 3 Beasley, Section 26-9-6, at 2,200 feet. Standard Oil Co.'s No. 1 Tensas, Section 23-8-5, is drilling sticky shale at 3,575 feet.

**DeSoto Parish**

American Controlled Oil Co.'s No. 1 Lanier, Section 7-11-11, is drilling at 2,751 feet. Benson Oil Co.'s No. 2 Wolff, Section 3-10-13, is drilling at 2,450 feet. Dixie Oil Co.'s No. 1 Jenkins, Section 9-12-11, is drilling lime at 6,103 feet. R. O. Roy's No. 1 Whitaker, Section 5-13-13, is drilling at 220 feet. The Texas Company, deepening No. 5 Grand Bayou Planting Co. in Section 25-13-12, is drilling shale at 2,452 feet.

**Grant Parish**

W. D. Ball and others' No. 2 Calhoun, Section 4-7-4, began drilling February 14 and has surface casing set at 120 feet. Swope and others' No 5 fee, Section 18-9-1e, is drilling at 1,420 feet.

**Natchitoches Parish**

Lawson & Pharis are drilling No. 1 Crowell, Section 22-5-6, in sandy shale at 2,758 feet.

**Richland Parish**

Gulf Refining Co.'s No. 1 Millsaps, Section 8-17-6, is reaming to bottom, total depth 2,855 feet; No. 1 Ches Wymond, Section 20-18-6, is drilling at 2,391 feet after a show of salt water at around 2,350 feet. Moody & Seagraves' No. 1 McDonald, Section 9-15-5, is in shale at 2,308 feet. Noe & Meredith have cemented 6-inch casing at 2,286 feet on No. 1 Boughton, Section 4-15-6. Oliver & Masters' No. 2 Hatch, Section 2-15-5, set 8-inch casing at 2,285 feet. Ouachita Natural Gas Co.'s No. 1 Cummings, Section 24-17-5, is bailing 6-inch casing set at 2,311 feet. Woodley Petroleum Co. began drilling No. 1 Osborn, Section 3-17-7, February 18, set 15½-inch surface string at 120 feet and 10-inch at 1,091 feet.

**Sabine Parish**

Borden and others' No. 1 Hamlin, Section 20-10-13, has surface casing, 12½-inch, set at 145 feet. W. G. Doerne is drilling No. 1 Pickering, Section 17-4-11, at 2,010 feet. R. L. Gray began drilling third hole on No. 1 Mansfield Lumber Co., February 15, set 10-inch casing at 80 feet and is drilling at 650 feet. Zwolle Oil & Gas Co.'s No. 7 Bowman-Hicks, Section 14-7-14, is still fishing for testing tool lost at 3,822 feet.

**West Carroll Parish**

Palmer Corp. is drilling out cement in No. 1 White, Section 2-19-10, after cementing back from 2,849 feet to 2,445 feet.

**Winn Parish**

Ohio Oil Co.'s No. 2 Iolen, Account 1, Section 5-12-1w, was dry at 4,454 feet and is reaming to bottom.

**ARKANSAS**

**Bradley County**

Johnson & Adams are drilling gumbo at 2,578 feet in No. 1 Southern Lumber Co., Section 12-12-12.

**Clark County**

McKenzie Oil Co. tested fresh water at 646 feet in No. 1 Eakin, Section 9-11-19, (second hole) and were still in a water sand at 650 feet.

**Columbia County**

George Dawley has made location in Section 12-17-22 for o. 1 Gantt and has derrick up.

**Logan County**

M. W. Greeson has made location 300 feet north and east SW cor. Section 27-8-24 for No. 1 Hatwig.

**Miller County**

Bruton and others began drilling No. 1 Red River Farms, Section 2-17-26, February 16, set 10-inch surface string at 50 feet and are making hole. Lenz and others set 10-inch casing at 108 feet in No. 3 Dale, Section 23-15-26, and are drilling at 1,500 feet.

**Union County**

W. R. Keever is rigging up to drill No. 2-B Kavanaugh, SE cor. SW NE, Section 12-17-15. Lyell and others' No. 1 Stegall, Section 11-17-13, is drilling at 1,620 feet. Rhodes and others have rig up for No. 1 Union Saw Mill Co., Section 14-19-11.

## GULF COAST FIELDS

(Continued from Page 59)

and slightly south of the No. 1, in which drill stem stuck at 210 feet. They are in the Jacob Walters Survey.

Griffith and associates' No. 1 Griffith, near Houston, Harris County, has started drilling and down about 500 feet. Humble Oil & Refining Co. abandoned its No. 1 Tex-Ex.-Warren at Hockley, a'so in Harris County. The latter hit cap rock at 399-407 feet. This company's No. 2 Warren at Hockley is drilling hard sand at 4,268 feet. Juanita Oil Co.'s No. 1 Kitsman at Cypress, Harris County, has been shut down.

Oscar Head's No. 1 Boykin, Jasper County, is drilling around 1,200 feet. James McMurry and associates' No. 1 Crosby, 5 miles northeast of Port Arthur in Jefferson County, is drilling below 2,800 feet. Port Arthur Oil & Gas Co.'s No. 4 west has been shut down at 3,510 feet. Freeport Sulphur Co. at Big Hill, Jefferson County, has abandoned its No. 10 Staiti in cap rock at 404-20 feet.

Rich Oil Corp.'s No. 1 Lee, 3 miles west of Lissie, Wharton County, is drilling around 1,500 feet.

**Miscellaneous Louisiana Wildcats**

Louisiana Land & Exploration Co. has abandoned its No. 1-A Calcasieu Lake at Big Lake, Cameron Parish, at a total depth of 3,000 feet. Newton Drilling Co.'s No. 1 Dupre, south of Lake Charles, Calcasieu Parish, is drilling sand and lime below 3,700 feet. Louisiana Land & Exploration Co. is starting a new test at Vermillion Bay, Iberia Parish. This will be No. 2-A Vermillion Bay, Section 20-15s-8e, 3,865 feet south and east of No. 1-A Vermillion Bay, which was abandoned several weeks ago after drilling into salt to a total depth of 941 feet.

At White Castle, Iberville Parish, Roxana Petroleum Corp.'s No. 1 Wilbert is coring at 1,905 feet in broken cap rock and sand and has a slight showing of oil and gas. This corporation also has a location for a second test at White Castle.

Rycade Oil Corp.'s No. 2 Atchafalaya, St. Martin's Parish, is coring at 2,813 feet.

## GULF COAST WILDCATS

(Continued from Page 59)

9 Wisdom, which is being deepened, is down 4,341 feet in hard sand.

**Bolling—Fort Bend and Wharton**

Southern Exploration Co has abandoned its No. 1 Mullins, Wharton County, after drilling to 3,950 feet. This was a deep test. On the northeast flank in Fort Bend County, Sun Oil Co.'s No. 7 (H. R.) Farmer is drilling below 1,200 feet. No. 5 J. R. Farmer is down 3,300 feet; No. 6 on the same tract is drilling at 1,000 feet and No. 7 at 810 feet. No. 2 Kasparek is drilling at 1,290 feet.

**Pierce Junction—Harris County**

Anderson & Plummer's No. 2 Whitehead tested dry at 4,475 feet but is being deepened. Joe Bashara's No. 2 fee has been shut down at 2,610 feet. H. R. Cullen's No. 4 Howe, which recently blew out, was brought in the past week flowing 50 bbls. from the sand at 4,919 feet, but this test will be deepened. Gulf Production Co. is drilling at 3,430 feet in No. 24 Taylor. Its No. 9 Taylor, an old well to be deepened, is being washed to the bottom. Gulf also is cutting and pulling liner in its No. 1 Saunders fee, another old well to be deepened. Leonard and associates' No. 1 Settegast is drilling at 5,075 feet. The Moody Corp. has abandoned its No. 2 Whitehead. This test was drilled to a total depth of 3,295 feet but was sidetracked and drilled to 3,090 feet. This company's No. 3 Hume was being swabbed at 4,355 feet as the week closed. No. 1 Cooper is drilling at 4,485 feet. Moody Corp.'s No. 1 Marland fee, an old well being deepened, failed to make a well when bailed at 4,680 feet and is being deepened further. Navarro Oil Co. is drilling at 4,448 feet in No. 2-A Cain. Rio Bravo Oil Co.'s No. 1 P.S.A. is drilling around 1,660 feet, its No. 2 G H.& S.A. at 4,245 feet, No. 101 G.H.&S.A. at 5,500 feet, No. 8-A Settegast at 3,740 feet and No. 7-B Settegast at 4,280 feet.

**Goose Creek—Harris County**

Gulf Production Co. has completed its No. 2 San Jacinto Bay pumping 22 bbls. of oil from sand at a total depth of 3,123 feet. This is an old well deepened. No. 19 Hoffman-Gaillard, another old well, is drilling deeper at 2,550 feet. A rig is up to deepen No. 16-A Tabb. Humble Oil & Refining Co. worked over its No. 20 A. Smith and got a small well. The latter company's No. 73 Simms Smith is drilling in sand at 5,288 feet, while No. 10 Sweet is in a sand at 2,580 feet. Casing has been cemented at 2,810 feet in No. 5 Gaillard and the well will be drilled in as soon as the cement sets. Humble also is placing two more of its old wells on the pump, Nos. 27 and 30 Gaillard, the former at 2,909 feet and the latter at 4,310 feet. Powell Oil Co. has shut down operations at its No. 6 Bryan with the hole down 2,625 feet.

**Hardin County Domes**

At Batson, Ada Bell Oil Co. is starting drilling in its No. 118 Producers. East Batson Oil Co. has set strainer at 1,180 feet in its No 10 Conzelman. At Saratoga, Gulf Production Co.'s No. 25 B.B. B.&C. is drilling below 800 feet. Humble Oil & Refining Co.'s No. 2 Farish & Ireland at Sour Lake is drilling shale at 1,899 feet. Gulf Production Co. has cemented casing at 3,700 feet in No. 3 Thomson and has drilled the plug and set strainer for a test. Gulf's No. 1 Hamman is drilling at 1,480 feet.

**Spindletop—Jefferson County**

No new production was added at Spindletop the past week but on the other hand one test was abandoned. The latter was Sun Oil Co.'s No. 2 Price, which tested salt water at 5,375 feet. During the previous week, although not reported until the past week, Yount Lee Oil Co. worked over one of its old wells, No. 11 Yount Lee fee, bringing it in flowing 1,320 bbls. of pipeline oil from sand at 4,073 feet. Efforts of Gulf Production Co. to make a producer out of No. 8 Jack and Duff in sand at a total depth of 4,950 feet so far have been unsuccessful. The well started flowing by air at the rate of 100 bbls. of oil daily but the oil production has declined until now it is making only about 6 bbls. of oil with lots of salt water. It has not been decided whether the well will be deepened or abandoned. No. 7 Jack and Duff is drilling at 5,060 feet. Gulf's No. 13 Oakwood is drilling at 3,640 feet. A rig is up for No. 13-A Weed, a new test, and also one for No. 230 Gladys. The latter will be only a shallow test.

Sun Oil Co. has set strainer at 5,090 feet in No. 16 McLean. No. 19 McLean is drilling at 5,160 feet and No. 20 at 5,190 feet. Yount Lee Oil Co. is starting two new tests, Nos. 57 and 58 McFaddin.

North of Spindletop, Traders Oil Corp. is drilling around 3,500 feet in No. 1 Cissell.

**Hull—Liberty County**

Gulf Production Co. has set strainer in No. 89 Phoenix to test a sand at 3,233 feet. This company also has a rig up to deepen one of its old wells, No. 40 Phoenix, Empire Gas & Fuel Co. is rigged up at No. 28 Barngrover. Mecom Oil Co.'s No. 4 Mecom is standing at 4,030 feet.

Republic Production Co.'s No. 4 Dolbear, which tested salt water at 2,450 feet, is to be deepened. Strainer has been set in No. 41 Dolbear for a test at 2,675 feet. No. 73 Dolbear, another old well, is being deepened. The Texas Company and Vacuum Oil Co.'s No. 7 Hannah encountered sand and shale at 4,787 feet and is coring ahead.

**Liberty—Liberty County**

In the north extension to the South Liberty Field, Yount Lee Oil Co.'s No 2 Mitchell is down to the producing sand encountered by the No. 1 Mitchell at 3,985 feet. Sun Oil Co.'s No. 1 Mitchell, an offset, is down 3,250 feet where casing has been cemented. The Texas Company's No. 8 Monroe heirs, 200 feet south of Yount Lee's No. 1 Mitchell, the extensioner, is drilling around 1,500 feet, and about a mile north, The Texas Company's No. 1 Green is drilling around 1,000 feet

**High Island—Galveston County**

As the week closed, McLean Oil Co. was attempting to make a producer out of No. 6 Cade at its deepened depth of 3,325 feet. Strainer had been set there and the test was swabbing. No. 6-C Cade is drilling at 2,600 feet. Gulf Production Co.'s No. 2 Smith is drilling at 4,880 feet Gulf is getting ready to deepen No. 2-A Smith.

**Orange—Orange County**

Rycade Oil Corp. is cutting and pulling liner to deepen its No. 13-E State in Cow Bayou. This well tested only salt water at 4,798 fet. Sun Oil Co. has set casing for a test of sand at 5,250 feet in No. 2 Brown. Gulf Production Co. is cutting and pulling liner to deepen its No. 2-A Kishi Lang. Its No. 6 Chessom is drilling at 3,500 feet. Rex Petroleum Co.'s No. 10 Carbello is drilling at 2,825 feet. Sinclair Oil & Gas Co's No. 4 Granger is drilling around 3,535 feet.

**Markham—Matagorda County**

Rycade Oil Corp. and Humble Oil & Refining Co. are drilling shale at 1,735 feet in No. 1 Hudson and cutting casing in No. 3 Meyers preparatory to deepening it. Sexton Gas Co.'s No. 1 Smith is drilling around 1,500 feet.

**West Columbia—Brazoria County**

Humble Oil & Refining Co. worked over its No. 4 Coon for a small producer. The Texas Company's No. 52 Hogg, the only drilling well in the field, is down 2,250 feet. The latter is an old well being deepened.

**Moore's Field—Fort Bend County**

Gulf Production Co.'s No. 15 Moore is drilling at 2,060 feet. This is the only drilling test in the field.

**SOUTH LOUISIANA FIELDS**

**Lockport—Calcasieu Parish**

Vacuum Oil Co. and Gulf Refining Co.'s No. 4 State in Bayou D'Inde was brought in during the week but is spraying only 100 bbls. of fluid, of which 50 per cent is water. This well has only a little sand at a total depth of 4,716 feet. No. 3 Farquahar is drilling in a sand, shale and shell formation at 3,695 feet and showing some oil. No. 1-A fee is drilling shale at 5,493 feet. These operators have three other tests rigged up, No. 6 Bordages, No. 1 State in Calcasieu River and No. 5 Lock-Moore.

**Edgerly—Calcasieu Parish**

Wilson-Broach's No. 3 Wilson, Section 28-9s-11w, tested salt water when bailed at 3,753 feet but is to be deepened. Rex Petroleum Co.'s No. 8 Hunt has touched the sand at 3,550 feet and has set casing for a test. J. G. Sutton and associates' No. 1 Lyons has drill stem stuck at 3,829 feet. Gilmer Oil Co.'s No. 1 Fairchilds is drilling at 1,340 feet.

**Sulphur—Calcasieu Parish**

Union Sulphur Co. drilled out the 10-inch plug cemented at 1,330 feet and is drilling ahead below 2,200 feet in its No. 722 fee. Drilling also has been started in No. 24 fee.

**Vinton—Calcasieu Parish**

Vinton Petroleum Co.'s No. 9 Gordon was brought in during the week making a small gas flow from sand at 3,175 feet but has been shut in. Production estimates have not been made. Seiss Oil Corp.'s No. 5 Green was put on the pump but is making only water. Marrs McLean has set strainer in his No. 1 H.&N.G. to test a sand at 2,110 feet. Edgerly Petroleum Co 's No. 11 Vincent is drilling ahead, although the last depth reported was 3,760 feet. Vinton Petroleum Co. is to put its

No. 61 Gray on the pump for a sand at 2,390 feet.

**Starks—Calcasieu Parish**

Gulf Refining Co. has abandoned its No. 8 Lutcher-Moore after an unsuccessful fishing job at 3,190 feet. No. 10 Industrial is drilling at 2,350 feet.

## KANSAS FIELDS

(Continued from Page 52)

SW, Section 30-22-13. The rig has been moved out for No. 3 Schwab "B," NW cor. NE SW; and the rig for No. 4 Schwab "B" is being built in the NE cor. SW, Section 30-22-13. Skelly Oil Co. made location for No. 1 Schwab, SW cor. NE, Section 30-22-13.

Tidal Oil Co. is building the rig for No. 1 Schwab, SE cor. NW SE, Section 30-22-13, and location was made for No. 2 Schwab, SW cor. NW SE, Section 30-22-13. The rig is on the ground for No. 3 Schwab, NW cor. SE, Section 30-22-13. Location was made for No. 4 Schwab, NE cor. NW SE, Section 30-22-12. Nathan and others made location for No. 1 South, NE cor. NW SE, Section 36-23-10. Davis and others staked location for No. 1 Olson, NE cor. SE, Section 6-25-9. Empire Oil & Refining Co. made location for No. 1 Johnson, SE cor. NE NE, Section 8-25-13. Hood and others moved a machine to the location for No. 1 Russell, C SE SE, Section 15-26-11.

Theta Oil Co.'s No. 4 Fankhouser, SW cor. SE, Section 23-22-12, had sand at 1,669-1,719 feet and made 100 bbls. after a shot of 200 quarts. No. 5 Fankhouser, NE cor. SE SW, Section 23-22-12, made 25 bbls. after a shot of 80 quarts in sand at 1,670-82 feet. Empire Oil & Refining Co.'s No. 6 Ott "A," SE cor. NE NW, Section 25-22-12, was completed for 150 bbls. in sand at 1,691-1,707 feet. No. 7 Ott "A," SW cor. NW NW, Section 25-22-12, made 125 bbls. from sand at 1,670-1,711 feet. No. 9 Schwab, SE cor. NE, Section 25-22-12, was completed for 420 bbls. from sand at 1,682-1,715 feet. Simmons & Rhodes' No. 1 Schwab, SW cor. NE SE, Section 30-22-13, came in for 150 bbls. in sand at 1,681-1,701 feet. Marcus and others' No. 1 Freeman, NE cor. SE SW, Section 6-24-11, made 45 bbls. after a shot of 60 quarts in sand at 1,826-40 feet. Culp and others' No. 1 Smith, C NE SE, Section 28-27-13, is dry and abandoned at 1,575 feet.

**McPherson County**

Rosenthal and others made location for No. 1 Johnson, C SE SE, Section 30-18-2w. Lamar and others' No. 1 Lamar, SE cor. SW, Section 1-17-3w, is dry and abandoned at 3,600 feet.

**Marion County**

Sherrer, Braden and others made location for No. 1 Wright, SW cor. NW SE, Section 14-18-4. Phillips Petroleum Co.'s No. 1 Mowrer, NE cor. SW NE SE, Section 22-17-4, Lost Springs Pool, was completed for 40 bbls. in sand at 2,390-2,440 feet. Givens and others' No. 1 Ucker, SW cor. NE, Section 31-17-4, has been abandoned at 2,703 feet.

**Morris County**

Madison and others made location for No. 1 Barkin, NW cor. SW SE, Section 29-15-5. Farrell and others moved the rig out for No. 1 Albright, SW cor. SE NE, Section 20-16-5.

**Seward County**

Ash and others' No. 1 Son, NE cor. Section 14-33-33w, is drilling deeper at 1,710 feet.

**Sumner County**

Roxana Petroleum Corp. has the rig on the ground for No. 4 Sleigh, SW cor. SE NW SW, Section 25-31-2, Churchill Pool. The rig has been moved out for No. 6 Shore "B," NW cor. SE NW SW, Section 25-31-2. Washahoma Oil Co.'s No. 1 Bussard, NE cor. SE NE SE, Section 26-31-2, is drilling at 780 feet. Roxana Petroleum Corp. has built the rig for No. 5 Taton, SW cor. NE NW, Section 36-31-2. The rig is up for No. 10 Community, Lot 4, Block 84, Oxford Townsite, Section 11-32-2. Noble and others made location for No. 1 Sheek, Tract 5, Oxford Townsite, Section 14-32-2. Wasson and others' rig is being built for No 7 Gassoway, SW cor. SE SW, Section 14-32-2. Roxana Petroleum Corp. made location for No. 3 Fritz, Out Lot 26, Oxford Townsite, Section 14-32-2. The rig is under construction for No. 2 Barnes, SE cor. SW SW, Section 14-32-2. The rig is up for No. 11 Emerich, Oxford Townsite, Section 14-32-2. Location has been made for No. 12 Emerich, Tract 5, Oxford Townsite, Section 14-32-2. Palmer and Barnsdall Oil Co.'s No. 3 Wenrich, NW cor. NE NW, Section 23-32-2, is a rig under construction. The rig is going up for No. 4 Wenrich, NE cor. NW NW, Section 23-32-2.

Roxana Petroleum Corp.'s No. 1 Bussard, NW cor. Tract 2, Oxford Townsite, Section 14-32-2, made 156 bbls. from sand at 2,021-2,103 feet.

**Woodson County**

Young and others' No. 1 Otto, SW cor. NW NW, Section 21-23-14, made 20 bbls. after a shot of 80 quarts in sand at 1,626-43 feet.

## OKLAHOMA FIELDS

(Continued from Page 52)

Field by companies and leases on Friday, February 24, is given below:

**Little River**

| Company, farm— | Wells | Prod. |
|---|---|---|
| Amerada: | | |
| Fore | 2 | 1,075 |
| Nitey | 4 | 3,005 |
| Barnsdall: | | |
| Hotulke | 1 | 50 |
| Blackwell: | | |
| Nitey | 7 | 2,648 |
| Carter: | | |
| Fish | 5 | 1,930 |
| Jackson | 1 | 100 |
| Continental: | | |
| Cosar | 3 | 405 |
| Gypsy: | | |
| Brown | 1 | 50 |
| Campbell | 2 | 27 |
| Nungee | 1 | 45 |
| Pottey | 3 | 450 |
| Independent: | | |
| Harris | 1 | 108 |
| Davis | 1 | 1,880 |
| Indian Territory: | | |
| Campbell | 1 | 124 |
| Dungan | 3 | 2,706 |
| House, M. A. | 1 | 243 |
| House, W. E. "A" | 1 | 65 |
| House, W. E. "B" | 3 | 1,733 |
| Jackson | 3 | 2,248 |
| McCulla | 3 | 1,000 |
| Nitey | 7 | 1,678 |
| Phoebe, "A" | 3 | 812 |
| Phoebe, "B" | 4 | 441 |
| Reed | 1 | 148 |
| Soketheche | 4 | 963 |
| Hull | 1 | 118 |
| Magnolia: | | |
| Cruse | 1 | 651 |
| Pottey | 2 | 168 |
| Mid-Continent: | | |
| Wadsworth | 7 | 1,070 |
| Smith | 1 | 40 |
| Pine & Phillips: | | |
| Pottey | 2 | 1,242 |
| Prairie: | | |
| Dungan | 2 | .... |
| House | 4 | 2,085 |
| Roxana: | | |
| Smith | 1 | 5 |
| Shaffer: | | |
| Narcome | 1 | 20 |
| Sinclair: | | |
| Cosar | 2 | 1,770 |
| Superior: | | |
| Wadsworth | 1 | 18 |
| Snowden-McSweeney: | | |
| Tiger | 1 | .... |
| Texas: | | |
| Coker | 3 | 625 |
| Tidal: | | |
| House | 3 | 1,335 |
| Johnson | 1 | 70 |
| Total | 97 | 33,451 |

**Maud**

| | | |
|---|---|---|
| Barnsdall: | | |
| Fife | 1 | .... |
| Indian Territory: | | |
| State | 1 | .... |
| Total Maud | 2 | .... |

**Bowlegs**

| | | |
|---|---|---|
| Amerada: | | |
| Rasco | 8 | 2,395 |
| Atlantic: | | |
| Baker | 4 | 650 |
| Fleet | 4 | 515 |
| Grayson | 3 | 984 |
| Jones, A. | 3 | 117 |
| Jones, C. | 2 | 214 |
| Barnsdall: | | |
| McNac | 1 | 30 |
| Murrow | 4 | 676 |
| Carter: | | |
| Bowlegs | 4 | 1,150 |
| Burden | 3 | 330 |
| Harjoche | 6 | 695 |
| Hilly | 3 | 995 |
| Jones | 4 | 1,720 |
| McGeisey | 1 | 20 |
| Melisse | 1 | 285 |
| Walker | 4 | 655 |
| Wise | 12 | 3,810 |
| Empire: | | |
| Lacy | 6 | 603 |
| Wise | 2 | 562 |
| Gypsy: | | |
| Bowlegs | 1 | 167 |
| Bradley | 1 | 5 |
| Cumsey | 4 | 1,707 |
| Dosar | 1 | 100 |
| Grayson | 4 | 1,127 |
| Harjoche | 2 | 1,232 |
| Henderson | 1 | 62 |
| Jones | 1 | 360 |
| Walker | 8 | 1,960 |
| Wise | 3 | 75 |
| Barnett, A. | 1 | 355 |
| Indian Territory: | | |
| Barnett, B. | 2 | 275 |
| Billington | 5 | 683 |
| Bowlegs | 11 | 1,550 |
| Davis | 4 | 1,135 |
| Fay | 9 | 2,626 |
| Goforth | 11 | 1,873 |
| Livingston | 11 | 3,966 |
| Lizzie | 2 | 592 |
| Walker | 8 | 1,044 |
| Wilmont | 4 | 888 |
| Work | 1 | 135 |
| Youngblood | 2 | 285 |
| Magnolia: | | |
| Davis, B. F. | 2 | 703 |
| Davis, M. | 1 | 339 |
| Hammond | 3 | 480 |
| Rhoades | 2 | 4,808 |
| Van Buskirk | 1 | 258 |
| McColloch: | | |
| Bowlegs | 3 | 390 |
| Mid-Continent: | | |
| Baker | 4 | 1,700 |
| Bowlegs | 1 | 45 |
| Hatke | 1 | 1 |
| Smith | 6 | 720 |
| Minnehoma: | | |
| Bowlegs | 3 | 365 |
| Prairie: | | |
| Gahagan | 4 | 390 |
| Harber | 8 | 3,525 |
| Jones | 4 | 475 |
| Templeton | 5 | 3,090 |
| Whitney | 4 | 465 |
| Pure: | | |
| Reed | 15 | 3,487 |
| Strothers "D" | 4 | 608 |
| Strothers "F" | 3 | 1,013 |
| Roxana & Houston: | | |
| Taylor | 5 | 1,145 |
| Shaffer: | | |
| Lacy | 3 | 540 |
| Sinclair: | | |
| Bowlegs | 1 | 60 |
| Cumsey | 4 | 5,500 |
| Ellen | 7 | 1,712 |
| Harjo | 3 | 790 |
| Jones | 6 | 4,340 |
| Taylor, M. | 4 | 3,053 |
| Taylor, W. | 1 | 1,692 |
| Walker | 4 | 775 |
| Texas: | | |
| Reed | 11 | 2,825 |
| Tidal: | | |
| Grayson | 4 | 1,105 |
| Harjoche | 6 | 2,230 |
| Twin States: | | |
| Jones | 3 | 53 |
| Total Bowlegs | 310 | 87,230 |

**Earlsboro**

| | | |
|---|---|---|
| Atlantic: | | |
| Foreman | 1 | 340 |
| Amerada: | | |
| Anderson | 2 | 1,445 |
| Cowden | 8 | 1,940 |
| Rodgers | 3 | 1,350 |
| Barnsdall: | | |
| Brown | 4 | 1,673 |
| Bruner, F. | 2 | 1,010 |
| Bruner, N. | 4 | 1,608 |
| Cudjo, C. | 1 | 26 |
| Davis, D. | 3 | 1,698 |
| Davis, J. | 4 | 730 |
| Davis, M. | 3 | 166 |
| Gibson | 8 | 3,346 |
| Hearn | 1 | 6 |
| Ingram | 7 | 5,263 |
| Pack | 4 | 198 |
| Peter | 4 | 324 |
| Sango | 3 | 7,019 |
| Sebolka | 1 | 815 |
| Sullivan, H. | 2 | 17 |
| Sullivan, Harjo | 3 | 68 |
| Wasutke | 4 | 1,861 |
| Carter: | | |
| Davis | 2 | 570 |
| Payne | 3 | 140 |
| Sango | 4 | 3,395 |
| Continental: | | |
| Kays | 2 | 240 |
| Spencer | 4 | 665 |
| Crosbie: | | |
| Bryant | 2 | .... |
| Empire & Rout: | | |
| Barker | 1 | 1,497 |
| Empire: | | |
| Edmundson | 3 | 1,213 |
| Gypsy: | | |
| Bruner | 4 | 1,840 |
| Carter | 10 | 3,602 |
| Earl | 1 | 15 |
| Hunick | 1 | 2,190 |
| Boro: | 1 | .... |
| Noble | 4 | 4,002 |
| Peter | 3 | 152 |
| Sango | 5 | 4,737 |
| State | 4 | 1,197 |
| Independent: | | |
| Bruner | 4 | 145 |
| Sullivan | 4 | 18 |
| Knapp | 6 | 2,459 |
| Gaines | 4 | 980 |
| O'Dell | 4 | 25 |
| Inter-Ocean: | | |
| Payne | 1 | 20 |
| Magnolia: | | |
| Bryant | 6 | 2,643 |
| Cowden | 4 | 65 |
| Dixon | 1 | .... |
| Edmundson | 3 | 42 |
| Holmsley | 8 | 1,854 |
| Ingram | 1 | 30 |
| Lena | 3 | 78 |
| Sear | 9 | 5,315 |
| Simpson | 4 | 313 |
| Sparks | 7 | 2,349 |
| Sullivan | 3 | 113 |
| Mid-Continent: | | |
| McCumber | 7 | 325 |
| Mid-Kansas: | | |
| Anderson | 4 | 210 |
| Phillips: | | |
| Dunnaway | 1 | 20 |
| Graham | 7 | 330 |
| Prairie: | | |
| Baker | 1 | 50 |
| Davis | 4 | 5,035 |
| Graham, C. | 2 | 45 |
| Graham, O. | 4 | 2,585 |
| St'dham | 13 | 3,825 |
| Roxana: | | |
| Bayliss | 1 | 14 |
| Spencer | 2 | 1,802 |
| Shaffer: | | |
| Clark | 5 | 1,141 |
| Sinclair: | | |
| Foreman | 1 | 15 |
| Hollins | 3 | 325 |
| Sango | 2 | 3,740 |
| Skelly: | | |
| Spencer | 2 | 756 |
| Texas: | | |
| Anderson | 6 | 825 |
| Brown | 8 | 2,650 |
| Rodgers | 4 | 5,832 |
| Wilmont | 6 | 2,940 |
| Tidal: | | |
| Watkins | 8 | 3,670 |
| Twin State: | | |
| Barker | 3 | 65 |
| Hearn | 4 | 3,695 |
| Total Earlsboro | 290 | 110,740 |

**Seminole**

| | | |
|---|---|---|
| Carter: | | |
| B. Carter | 2 | 185 |
| J. Carter | 3 | 35 |
| F. Carter | 2 | 75 |
| Creamer | 2 | 35 |
| R. Cudjo | 4 | 500 |
| W. Cudjo | 2 | 5 |
| Gilliland | 2 | 300 |
| Grisso, M. | 1 | 235 |
| Grisso, W. | 5 | 550 |
| Jackson | 1 | 10 |
| Knapp | 3 | 75 |
| Killing, M. | 12 | 6,900 |
| Killing, G. | 4 | 430 |
| Lukes | 7 | 1,500 |
| Ponder | 2 | 27 |
| Simpson | 3 | 70 |
| Strother | 4 | 415 |
| Vierson | 3 | 300 |
| Amerada: | | |
| Fixico | 4 | 1,215 |
| Killing | 4 | 570 |
| Rentie | 3 | 615 |
| Atlantic: | | |
| Cudjo, N. | 3 | 480 |
| Barnsdall: | | |
| Carter | 8 | 2,225 |
| Henry | 2 | 525 |
| Jones | 4 | 1,135 |
| Empire: | | |
| Gross | 3 | 65 |
| Wilson | 2 | 300 |
| Gypsy: | | |
| Butler | 4 | 587 |
| Carter | 8 | 350 |
| Cudjo | 5 | 425 |
| Fixico | 7 | 150 |
| Harjo | 3 | 1,050 |
| Wolf | 6 | 227 |
| Independent: | | |
| Butler | | 1,025 |
| P. Fixico | 3 | 250 |
| Harjo | 3 | 115 |
| Independent & Garland: | | |
| T. Fixico | 8 | 610 |
| Independent & Interocean: | | |
| Jones | 4 | 400 |
| Indian Territory: | | |
| Allen | 2 | 462 |
| Bowlegs | 12 | 2,490 |
| Gooden | 4 | 367 |
| Harjo | 3 | 110 |
| James | 2 | 241 |
| Reed | 2 | 25 |
| Kingwood: | | |
| Johnson | 3 | 1,237 |
| Magnolia: | | |
| Born | 1 | 112 |
| Franks | 4 | 750 |
| Mid-Continent: | | |
| Rentie | 9 | 1,200 |
| Tayeche | 7 | 227 |
| Mid-Kansas: | | |
| Wilkins | 1 | 1 |
| Phillips: | | |
| Strothers | 2 | 150 |
| Prairie: | | |
| Gross | 5 | 125 |
| Mason | 1 | 75 |
| Spencer | 1 | 15 |
| Strother | 8 | 1,500 |
| Pure: | | |
| Strother, A. | 17 | 5,175 |
| Strother, B. | 5 | 1,000 |
| Strother, C. | 1 | 190 |
| Roxana: | | |
| Harber | 2 | 200 |
| Lashley | 2 | 12 |
| Sinclair: | | |
| Carter | 2 | 28 |
| Cudjo, A. | 6 | 940 |
| Cudjo, B. | 4 | 1,100 |
| Dicey | 2 | 1,465 |
| Fixico | 4 | 1,000 |
| Slick: | | |
| Cudjo | 3 | 710 |
| Franks | 8 | 1,625 |
| Giblet, Sam | 3 | 2,000 |
| Tiger | 1 | 75 |
| Superior: | | |
| Cudjo | 4 | 315 |
| Texas: | | |
| Mayhue | 1 | 200 |
| Strothers | 2 | 125 |
| Tidal: | | |
| Carter | 4 | 780 |
| Fixico | 6 | 770 |
| Harjo, D. | 3 | 750 |
| Harjo, T. | 6 | 185 |
| Mahardy | 2 | 93 |
| Tayeche | 1 | .... |
| Turman: | | |
| Cudjo | 4 | 1,425 |
| Grisso | 1 | 250 |
| Jones | 4 | 1,187 |
| Total Seminole | 314 | 55,965 |

**Searight**

| | | |
|---|---|---|
| Carter: | | |
| Davis | 7 | 755 |
| Frazier | 6 | 2,000 |
| Johnson | 1 | 5 |
| Kiker | 1 | 30 |
| Mandler | 2 | 25 |
| Scott | 1 | 20 |
| Amerada: | | |
| Johnson | 1 | 70 |
| Strother | 2 | 1,317 |
| Gypsy: | | |
| Cudjo | 4 | 715 |
| Mid-Continent: | | |
| Grayson | 6 | 65 |
| Soloche | 3 | 2,000 |
| Pine: | | |
| Lulla | 1 | 27 |
| Prairie: | | |
| Cannon | 1 | 10 |
| Carter | 1 | 15 |
| Houck | 1 | 5 |
| Kincaid | 5 | 105 |
| Wiemer | 1 | 10 |

| | | |
|---|---|---|
| Wilson | 1 | 62 |
| Pure: Aldridge | 6 | 2,488 |
| Roxana: Strother | 4 | 2,685 |
| Sinclair: Polly | 4 | 1,820 |
| Texas: Fleet | 1 | 50 |
| Twin State: Varnum | 2 | 395 |
| Wilcox: Chupco | 8 | 2,246 |
| Total Searight | 71 | 17,783 |
| Total Little River | 97 | 33,451 |
| Total Bowlegs | 310 | 87,230 |
| Total Earlsboro | 290 | 110,740 |
| Total Seminole | 314 | 55,985 |
| Total Searight | 71 | 17,783 |
| Total Maud | 2 | .... |
| Grand total | 1,155 | 305,189 |

## ROCKY MOUNTAIN AREA

(Continued from Page 61)

Dome in Colorado, is being closely watched. After going through heavy gas in the Morrison formation, it was showing some oil in the bottom of that horizon in gray sandy shale at 1,950 feet, the showing amounting to about 1½ bbls. in six hours. At 2,020 feet it was in sticky blue shale and feeling for the Sundance which is expected at almost any time. Casing will be run before drilling into the Sundance. Same company's No. 1 Early, SE cor. SW, Section 13-4s-6w, Duchesne structure, is underreaming at a total depth of 2,970 feet. The contract calls for a 3,500-foot test and five or six sands are expected before reaching that horizon. The drilling is in the Tertiary. Utah Southern Oil Co.'s No. 1-A John L. Shafer, Section 36-26-20, Cane Creek Dome, is drilling at 525 feet in limestone. Same company's No. 1 Canyon, Section 18-41-19, East anticline, San Juan County, is drilling at 1,660 feet in lime. Texas Production Co.'s No. 1 Shipley, Section 5-27-14, Sweetwater Dome, Wayne County, is still fishing at 2,885 feet. The Embar Oil Co.'s No. 1 Big Six, Section 34-25-21, Moab Dome, is drilling at 5,315 feet in black shale and showing a trace of oil. The Mid-American Oil Co.'s No. 1, Section 17-43-15, Bloomington Dome, Washington County, is drilling at 1,300 feet. Boulder Knoll Oil & Gas Co.'s No. 1, Section 17-34-25, San Juan County, is shut down at 2,300 feet waiting for 6¼-inch casing. Western Ventura Oil Corp.'s No. 1, Section 6-5-20, Vernal monocline, is drilling at 400 feet. Maud Ellen Oil Co.'s No. 1, Section 28-3-21, Neal Dome, is running 10-inch casing at 638 feet to make a water shutoff.

S. J. Brendal and associates, of McKeesport, Pa., are reported to have acquired 800 acres close to the Crescent Eagle Oil Co.'s No. 1, Section 4-22-19, near Thompson, in Grand County, and it is reported that a standard rig will be erected at once for an oil and potash test. This well cut a number of sands imbedded in salt showing a little oil and gas. It has been shut down at 4,000 feet for a long time. The Armstrong Co. drilled a near-by test for potash, but went only to around 1,200 feet.

The Continental Oil Co.'s No. 1, Section 23-43-22, Boundary Butte Dome, is cementing cave at 3,315 feet.

### Colorado

The Florence Pool in Fremont County, including the old field which has been producing for more than 40 years, and the west and south extensions, more recent developments, established a high record the past week when it produced 1,380 bbls., the largest output for a single day in 25 years. This is becoming a more interesting operation than it has been for some time on account of the size of the wells, the inexpensive drilling, and its freakish nature. Production in the old pool was entirely from the Pierre shale, but in the extension towards Canon City on the west, the oil is coming from a sandy shale horizon. While the field has a record of more than 12,000,000 bbls., the oil has all been pumped. Continental Oil Co.'s No. 1 H. C. Watts, SE SE, Section 35-18-17, is drilling at 850 feet. Same company's No. 1 Kissinger & Wright, NE NW, Section 4-19-70, is drilling at 950 feet. Same company's No. 1 Robbins, SW NE, Section 3-19-70, which was completed at 2,190 feet, has been deepened to 2,230 feet where it made 30 bbls. the first 24 hours. Some times these wells show an increase and again a decrease after the first day's pumping, and for that reason the initial production is not a true indication of a well's capacity for settled production. The Continental's No. 1 Lucas, SW SE, Section 3-19-70, was completed at 1,941 feet, with a production of 70 bbls. in the first 24 hours. Sheffer & Benzona's No. 1 Colarelli, NW NE SE, Section 3-19-70, had a considerable flow of gas at 370 feet which gave some difficulty in shutting off. The Phantom Petro'eum Co.'s No. 1, SE NE, Section 34-19-69, is drilling at 890 feet. Same company's No. 1 Green, NW NE, Section 10-18-70, is drilling at 1,200 feet. It had water horizons at 320 30, 725-40 and 900-10 feet and at 970-80 feet it had some oil.

#### Moffat Dome

In northwestern Colorado, the most interesting operation at this time is the Texas Production Co.'s No. 10 Knowlton, Section 33-5-91, on the Moffat Dome, which was making around 100 bbls. a day from the Sundance sand at 4,400-26 feet when it was decided to deepen the hole in an effort to learn conditions deeper in the sand. In the Midwest Refining Co.'s No. 34-SD on the Iles Dome, the Sundance was drilled 63 feet and found to be more porous and a much better producer after it passed out of the hard and tight formation in the top part of the sand. The Knowlton well is finding a similar condition at a total depth of 4,446 feet, where the formation is loosening up and the gas pressure is increasing, but it is not yet into the big pay found in the Iles well. The next two or three days are expected to tell the tale. This is the only drilling well on the Moffat Dome. On the Iles Dome the Shaffer Oil & Refining Co.'s No. 205 Yarg, NW NW, Section 26-4n-92, is being closely watched. This is much lower on the structure than any of the Sundance wells so far drilled, and results will give a lineup on the extent of the probable producing area. The well is drilling at 3,490 feet and carrying the 8¼-inch casing. It is close to the bottom of the Dakota horizon and the casing probably will be set at 3,530 feet. The results in the Morrison, which lies just below the Dakota, are being anxiously awaited. Alliance Oil Co.'s No. 1 Milliken, SW cor., Section 14-4-92, is drilling daylight only and making slow progress. It is now drilling at 950 feet. The Midwest Refining Co.'s No. 8-SD Parkinson, NW NW, Section 23-4-92, is skidding rig. Its No. 7-SD Parkinson, NW NW, Section 23-4-92, is drilling at 2,400 feet in brown shale, and its No. 33-SD Parkinson, SW SE, Section 22-4-92, is ready to commence spudding. The Texas Production Co.'s No. 17 State, NW SE Section 15-4-92, joint with the Kinney-Coastal Oil Co., is drilling at 2,550 feet, and its No. 6 Parkinson, NW NW, Section 23-4-92, is fishing at 2,658 feet. Same company's No. 13 Parkinson, NE SW, Section 22-4-92, is drilling at 1,980 feet.

#### Tow Creek Dome

In Routt County, the various wells are all idle. The Texas Production Co. is making a resurvey of the Tow Creek Dome on the basis of information obtained from logs of wells recently drilled and until this is completed, its plans as to future drilling will not be determined.

In Jackson County, near the Wyoming line, several of the Continental Oil Co.'s wells are at an interesting stage. No. 1 Peterson, SW SW, Section 1-9n-79, is drilling at 4,920 feet. It is just a short distance northeast of the discovery well which reached the Dakota at 5,110 feet. Same company's No. 1 Pollock, SE SE, Section 2-9-79, is drilling at 4,730 feet, and its No. 1 Hoye, SW NE, Section 34-9-78, on the south dome, is drilling at 4,615 feet with the objective expected at almost any time.

In Larimer County, the Union Oil Co. of California's No. 6 Buckeye, NE NW NE, Section 31-10-68, Wellington Dome, which was drilled into the sand last December, but not finished on account of casing trouble, has been completed in the Muddy sand at 4,385-4,418 feet with an initial production of 500 bbls. This is on a lease from the Union Pacific Railroad, and one of the best completions for some time. Same company's No. 1 K. W.&B., SW cor. NE, Section 19-8n-68, on the Fort Collins Dome, commenced spudding February 19. This is the farthest north of any well drilled on that structure. Buckeye No. 7, SE Section 31-10-68, cemented the 12½-inch at 1,260 feet. No. 2 Foster, Section 30-10-68, is cleaning out at 4,492 feet, and has not yet been put on production. No. 1 Gault-Piatt-Puleston, near center of Section 7-9-68, is cleaning out and running 10-inch at 2,255 feet. No. 1 Messerschmidt, NW NW NE, Section 30-8-68, Fort Collins Dome, which is being deepened to test the Lakota, is bottomed at 4,830 feet and reported to be in or close to that horizon and showing oil. However, the quantity of oil is not known as there was 4,000 feet of water from the Dakota standing on the sand. The Dakota was 70 feet thick. The well originally was a producer in the Muddy and was deepened as a test to the lower sands in the Dakota formation.

In Las Animas County, the Parker Club, Inc.'s No. 1 Adams, Section 32-34-56, near Branson, which was reported last week as having suspended drilling at 3,873 feet, is said to have been 10 feet into the granite when operations stopped. The Phillips Petro'eum Co.'s No. 1 Haskins, Section 23-29-56, on the Red Rocks structure, a joint operation with the Reiter-Foster Oil Co., is running the 12½-inch casing at 1,130 feet to shut off a considerable flow of water in a hard gray sand at 990 feet.

#### Huerfano County

In Huerfano County the Kinney-Coastal Oil Co.'s No. 1 Pinos, Section 24-26-68, Escondido structure, cut the Nio-Benton, or Carlisle as it is called in that area, at 950-75 feet. It was dry, showing neither oil, gas or water. It is drilling at 1,275 feet with the Dakota expected at around 1,400 feet.

The Northwestern Co'orado Oil Co.'s No. 1 State, Section 36-8-55, Willard Dome, in Logan County, is again drilling at 5,564 feet in the top of the Lakota sand. It was shut down at this horizon when caving commenced. Arrangements were made with the Argo Oil Co. and Continental Oil Co. for continuing the test. A 3½-inch liner run and tools were lost while cleaning out. The tools have been recovered and it is now making new hole. There is considerable gas showing at the bottom.

The new test to be drilled 5 miles west of Denver in Jefferson County, near Golden, by Charles F. Woods and others commenced spudding February 11. It is on the Ted Knowles place in the SE cor. NW, Section 30-3s-69, on what has been named the Table Mountain structure. Drilling started with standard cable tools in a 20-inch hole. It will be an interesting test. Sands in the Larmie and Foxhills formations will be the objective, the first expected at 1,200 to 1,400 feet, and the second at 2,000 feet. If it is found that the objective sands were eroded before the Arapahoe and Denver beds were deposited, the test will be continued on down to the Dakota. This probably will be determined when the drill reaches 2,500 feet as it will then be possible to make a more reliable estimate as to the depth to the Dakota. It will have to go 4,000 feet, or more, to reach that horizon even if considerable erosion has taken place. The structure was worked out by Dr. F. F. Hintze of Denver, and Dr. Van Tuyl, head of the geological department of the Colorado School of Mines.

### New Mexico

New Mexico had little of interest outside of routine to report for the week. In Lea County the Midwest Refining Co.'s No. 1 State, NE NE, Section 9-19-38, near Hobbs, has completed rigging up its new derrick following the destruction of the old derrick, and has resumed operations. At present it is fishing for tools at 1,560 feet. Cecil Bordages' No. 1 Hughes, Section 27-19-38, topped the salt at 1,680 feet and is drilling at 2,170 feet. The Maljamar Oil & Gas Co.'s No. 2 Beardsley, Section 15-17-32, is fishing at 4,295 feet, and the Marland Oil Co.'s No. 1 Eaves, SW NE, Section 19-26-37, is bottomed at 535 feet waiting for drilling nipple to set the 15½-inch casing.

In Eddy County R. D. Compton's No. 4 Mann, SW NW, Section 4-18-27, 4 miles west of the Artesia Pool and a mile east of the Pecos River, was given another shot at 1,955-2,000 feet after the lower pay had been bridged off. The oil rose 600 feet in about 40 minutes and continued to fill rapidly, shutting off the gas at a higher horizon. It looks as if it might make 150 bbls. initial and be a good well. The oil is of a better quality than has so far been found in that area and tests around 40 gravity and is light green in color. Compton's No. 1 Vendergriff, NE NW NE, Section 8-18-27, has commenced spudding, and the Getty Oil, Inc.'s No. 2 Dooley (Hinkle), NW Section 24-20-29, has commenced spudding and is drilling at 200 feet. Gates, Holman & Rehn's No. 1 Murdock, SW cor. NE, Section 7-21-28, set the 8¼-inch casing at 460 feet and is drilling at 500 feet.

In Chaves County the Arena Oil Co.'s No. 1 Wilkins, NE NW, Section 18-31-31, is drilling at 2,875 feet and nothing important has shown since it cut a sand in the red beds at 2,625-80 feet showing considerable gas. However, this test will now receive more attention than heretofore has been given it.

In McKinley County, in the northwestern part of the State, the Continental Oil Co.'s No. 1 Santa Fe Railroad, SW SW, Section 9-17-7, on the Carica Dome, is being abandoned at 3,190 feet. It was through the sands in the Dakota which were water bearing. It also had water in the sands in the Mesa Verde which was bottomed at 2,680 feet, there being three of these sands. It also had water at 320-38 feet. Producers & Refiners Corp.'s No. 3 Hospah, Section 12-17-9, is drilling at 1,620 feet in shale. Jenkins Oil Co.'s No. 1, SE cor. NE, Section 1-16-9, is reported underreaming to set pipe at a total depth of 1,300 feet. Reliance Oil Co.'s No. 1 Valentine, Section 15-17-9, is drilling at 1,250 feet.

In San Juan County the Huntington Park Oil Co.'s No. 1 Terwilliger, SE SE, Section 29-30-9, is drilling in another sand at 4,444 feet with a show of gas estimated at around 750,000 feet. P. G. Nollsch's No. 1 Mullen, Section 21-29-9, on the Largo structure, is shut down at 200 feet, due to ferry boat being out of operation. Union Oil & Mining Co.'s No. 2 Pine, SE SW, Section 8-29-9, after finishing up an 18-months' fishing job, lost another string of tools, which have since been recovered, and is drilling in sandy shale at 3,027 feet. A. Johnson, trustee's No. 1 Viles, Section 34-29-11, is shut down for cement to set at 1,732 feet. Continental Oil Co.'s No. 17, Section 2-29-19, deep test to Pennsylvanian, is drilling at 4,514 feet.

### Montana

The Flat Coulee well of the Sunburst Oil & Refining Co., located about 2 miles south of the Canadian boundary, has opened a new field in that part of Toole County. This well found the Ellis sand at 2,878 feet and began to flow. Cavings, however, partly shut off the flow. Several times the oil and gas has flowed out the cavings and gone wild for a short time.

The well has about 54 feet of open hole between the bottom of the casing and the top of the sand where the oil was found. The well was drilled through the Ellis sand and only a showing of gas encountered. A few days ago the test commenced to make oil and suddenly blew itself in. Another sand, the Quadrant, may be found just below the present depth of the hole, and might also be found to be oil bearing.

So far the effect of the strike has been to send leases and other holdings up in price. While the depth of the new field will be much greater than in the Sunburst Field, the cost per well is not prohibitive for small operators.

#### Water Well Flows 18,000 Bbls. Oil

Another cause for excitement in the Sunburst area is the Baker-Corey well on Section 9-34-1, in the Sunburst Field proper. This well was first produced as

(Continued on Page 217)

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1—12-in. Worthington Centrifugal Pump.
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# Waiting Attitude in Chicago Market

## Buyers and Sellers Seem to Be "Watching to See What Happens." More Activity Expected During March

By John B. Waldo

CHICAGO, Feb. 27.—The fact that the present is very close to the end of one of the least active business months of the year was evidenced in the local refined oil market today. The buying was slow and there was an inclination to put off ordering for a little while. The spot gasoline demand was only fair and there were offerings by a number of sellers who had February contracts which they were trying to close promptly. There was some U. S. Motor gasoline offered to dealers at 6 cents for immediate shipment and refiners holding for a higher price were obliged to fight for the order. It is not believed that there is much of this gasoline and the feeling is that with March there will be a better demand and firm if not higher prices.

There were no changes in quotations, refiners holding for 6⅛ to a quarter for the U. S. Motor grade. The demand for the higher gravities was in line with the business done in U. S. Motor grade. Refiners reported sales of kerosene as showing a little improvement and quoted 4⅛ to 4¼ cents for the 41-43 gravity. The demand for distillates was scattering and light as a whole with much warmer weather prevailing which tends to limit the buying.

Zero gas oils were sold in fair volume but the demand was rather hesitating, although prices were firmly held. Some inquiries were received for U.G.I. gas oil from gas companies with the market for this product seemingly pegged by the gas companies at 2½ cents. In some instances the companies stated that they were able to buy for their needs at slightly less than that price.

The fuel oil market shows considerable uncertainty, as buyers are slow to place their business and inclined to wait, believing that they may gain by so doing, while refiners state that their March prices will show no decline. Some business has been taken by dealers at prices which on the present basis of refinery costs show little or no profit. Many of the users are covered for their March needs, some claiming they had sufficient supplies ordered to carry them into April. Very generally there is a tendency to wait until after the beginning of March before taking action one way or another. Weather conditions may improve the demand but the distributors of fuel and furnace oils in this city and vicinity have considerable supplies of all needed oils either in stock or on order and will not be in the market for important quantities. Wait and see what happens is the attitude of the sellers and buyers of practically all petroleum products at the close of the month.

### Spot Market

The spot gasoline business done last week was not more than fair for the season and some refiners with contracts said their business was not as good as it had been as some of their contract customers were not ordering out their monthly quotas. Most of these who are asking for a little delay in shipments are in districts where the road conditions are bad and have little improved mileage on which to depend for their business. There were no changes in price conditions. The market for the U. S. Motor gasoline continued to show a range of from 6 to 6¼ cents. There were several refiners who held strictly to the 6¼-cent price and others who quoted that price but would meet competition of the refiners who were still selling at 6⅛ cents. One or two refiners and some marketers took business during the first half of the week at least at 6 cents when they had to do so or lose an order. Price did not seem to cut as much of a figure as it does some times and the business of those holding for the full prices was as good as that of concerns that sold for less. None did a business more than fair for a month which is commonly the most unsatisfactory of the year.

### Buying for Present

The demand for the higher gravities remained quiet and all buying was for present needs only. The advance in the posted prices of the higher gravity crudes did not have any noticeable influence on the local market. It is hoped March will bring more active buying and a better price situation. It usually does. There are very few dealers who are purchasing for more than their immediate needs and no evidence is obtainable of any large buying in anticipation of future requirements. Little is being said of the anti-knock gasolines but these are stated to be moving well but only for present necessities of the dealers. The introduction of a new grade of gasoline or a new motor fuel is necessarily a slow process. There are some few dealers who are able to make room in their storage for an additional grade and have a pump they can allot to its sale but with many they must displace some grade they are handling to take on a new product or invest money in additional facilities and there is only a small amount of expansion of facilities being done by the average distributor at present. Some of the larger organizations are increasing the number of their outlets, in most cases to have representation in likely territories for the sale of their product in competition with other refiners, but the smaller dealers and some that could afford to do so if they thought it wise, have discontinued all expansions. There are quite a number of dealers who have stated they would put in some of the newer special motor fuels as soon as they could arrange to do so. Others are waiting to see what the motorists will demand early in the coming season. The natural gasoline demand has been light here and prices were a little easier at the close of last week.

### Kerosene Firm

The kerosene market has been held rather firmly but it is rather in expectation of a coming demand than on the present purchases by dealers. The market was generally very quiet only occasionally a more active demand reported by some refiner. The recent rains and snows have softened the fields and it will require some weeks of favorable weather to make them fit for the use of the tractors. The same prices were quoted last week, the range for the 41-43 gravity being 4¼ to 4⅜ to dealers with very little doing at the higher price. Early March may see an improvement in demand. There is now very little call for the 42-44 gravity as the low flash which is given by many refiners to their 41-43 product makes it suitable for practically all requirements of the dealers.

### Distillates Slow

The cold snap last week did not bring any rush of distillate orders. The business consisted for the greater part of the week of occasional cars only. Many distributors and particularly the larger concerns have ample supplies on order, if not in storage and will not buy in the spot market. Those whose stocks are low and need replenishing are buying for weeks, not for months as they would do if the season were not near to its normal ending. Of course we may have a lot of cold weather yet. Last year April was a fine warm month but later the weather man served a lot of left over winter. The demand was just fair for the week as a whole. The bulk of the orders for 38-40 straw distillate went at 3¼ cents. Refiners held for their price and in many cases state they have only limited supplies and are decreasing their stocks steadily.

Gas oils showed little change. Prices for both zero and the straightrun grades were held firmly and offerings were not large although some refiners who had been sold up were again in the market with moderate quantities. There was desultory buying by gas companies but not for large quantities, the buyers being the less important concerns. Prices paid by these buyers ranged between 2½ and 2⅝ cents for the U.G.I. specification, the first named price being the low and the latter the high of the market for straightrun gas oil. The demand was chiefly from distributors of furnace oils and was for the zero gas oil and the heavier gravities, that is grades below the regular 32-36 oil. A tendency was noted on the part of some refiners to offer zero gas oil a little more freely, particularly in the straw grade which has commanded a premium over equally desirable oil that was darker in color.

### For Fewer Grades

In this connection it is freely predicted by distributors that the time is near at hand when there will be no premium paid for straw product. For one thing there is a desire to decrease the number of grades or kinds of furnace oils as it adds to the complications of the business to have two grades where one will equally well serve the purpose. It also increases the dealer's investment. There is no advantage to either the consumer or the dealer in carrying and delivering a straw gas oil so long as the flash and odor of the dark oil is acceptable. The Northern Louisiana refiners have had their representatives in the city calling on the trade and in some cases they have closed out their present stocks of gas oil. The price range last week was nominally 3 to 3¼ cents for the straw zero and 2¾ to 3 cents for the zero dark oil but actually the bulk of the business in the latter was done at 2⅞ cents, dealers remarking it should bring according to refinery costs 3 cents but 2⅞ cents was the top selling price except under exceptional circumstances. The conditions that prevailed last week seem likely to continue for several weeks with occasional spurts of small buying of zero oil by the distributors when colder weather increases consumption for brief periods but with little heavy business in the zero grades of gas oil with distributors as the larger ones are about taken care of for March or to the end of the season. The industrial demand is rather lagging and the buyers are ordering for immediate needs as they have been doing for so long a period.

### Fuel Oil

Fuel oil was a little easier to buy but no lower in price. Some of the refiners that were out of the market since late in January are back with fair to large amounts. One source of supply will have a considerable volume of 18-20 gravity fuel oil to sell. This oil is being offered for delivery over March at 85 cents. This is a zero oil with a sulphur content of about 1¾ per cent. Another refiner offered 16-20 fuel oil with a cold test ranging 30 to 35 degrees at 75 cents. Some small lots were sold at this figure so there is little change in prices. There are some large deals pending for stocks of fuel oil which may have a bearing on the market for March if they are completed. They are in the nature of large purchases of crude suitable for fuel oil and the prospective buyers are seeking prices which if they are able to secure them will give them supplies of fuel oil which they can sell to the users of heavy fuel at a price of 10 cents under the present market for this grade. This purchase, if made, will be very important to the trade as the buyers supply several of the largest industries and are very large dealers in fuel oil. The demand last week was a continuance of the hand-to-mouth purchasing. Prices held very firm on the zero oils which are wanted by most of the consumers at present. There are only a few large buyers that can use a heavy oil with a cold test ranging around 30 degrees. Prices were named by one refiner over March of $1.05 for 28-30 zero and $1.10 for 30-32 zero oil.

### Lubs Dull

Lubricating oils were dull in this market. Some deliveries are being made on contracts of purchase and occasionally there is a buyer for a car but the bulk of the demand has been for small quantities. The Pennsylvania oils are still offered at very low prices for that grade and it is remarked that bright stocks are very low in comparison with previous quotations or other products from the same crude. The motor oil demand continues to be merely of a routine nature. Some of the refiners with exclusive distributors are anticipating deliveries and in this way are making the task of filling their dealers' storage less burdensome as they spread the delivery period over a longer season. The consumption of motor oils is good for the season. The industrial demand is fair. Much complaint is heard of low prices quoted here on the delivered basis.

### Tank Wagon

In the Standard of Indiana territory the tank wagon scale is being gradually worked around to a position where very few points remain below normal. One of the events of the week, was the decision by the Illinois Supreme Court declaring the gasoline tax illegal on technical grounds. Undoubtedly the state authorities will attempt to pass a new law which will be proof against decisions of the highest court. There may be delays but that Illinois has as a result of that decision been permanently placed in the list of states with no gasoline tax is most unlikely. The tax on gasoline had no evident result in increasing or decreasing consumption in this state. The station keepers will at once cease to charge the tax. It is a fact that some distributors in the city have never priced their gasoline at the full rate but have absorbed the tax and charged the motorists 2 cents less than the regular station price which included the tax. This form of price cutting will disappear for the present at least.

Local distributors state their gallonage is averaging higher than a year ago at this time but that their business is uneven. Outside of the city the dealers in most localities are hampered more or less by bad roads. The dirt roads are in their usual spring condition, almost impassable. Driving from Chicago to Springfield recently a number of oil men stated that they did not see a single auto of any kind coming onto the state highway from a dirt road. In some sections the highway commissioners are restricting the use of trucks to those of the single ton capacity. Deliveries to customers off the paved roads are being made with much difficulty. Nothing unusual unless it be that the roads are soft a little earlier than usual.

# Diesel and Gas Oil Reduced in East

## No Changes in Other Departments of the Refined Market but Crude Revision Created Some Optimism

By N. O. Fanning
*New York Bureau, The Oil and Gas Journal, Room 629, No. 101 Park Avenue, New York, N. Y.*

NEW YORK, Feb. 24.—A reduction in the price of Diesel oil and gas oil was the leading feature of the eastern refined oil market during the past week. The Standard Oil Co. of New Jersey reduced Diesel oil 10 cents a barrel to $2 at New York, Baltimore and Charleston and to $2.20 at Norfolk. Gas oil in tank cars was cut one-quarter cent to 5¼ cents.

These cuts came as somewhat of a surprise to the trade. Lower prices for both Diesel oil and gas oil had been expected at the time of the decline in bunker fuel oil, but when they failed to occur, it was thought improvement would set in before any weakness developed. Although there had recently been some increase in competition in the Diesel oil trade the gas oil market, though dull, had shown no sign of weakening. The drop of one-quarter of a cent will probably affect contracts expected to be closed this spring for supplying local gas companies using more than 300,000,000 gallons yearly in the metropolitan district alone.

Although no change occurred in other departments of the eastern market, the increase in prices of high-grade crude created some optimism in the gasoline trade. This has not been translated in terms of actual improvement, however. Prices are holding steady, but there is no definite trend toward higher levels.

Consumption of oil products generally is extremely favorable, with the exception of some departments of the export trade. However, a much better feeling is gradually showing itself here and there, and the spring should bring with it some substantial gain, in the opinion of marketers.

The demand for oil tankers is improving somewhat, which is often a harbinger of improvement in general conditions, indicating as it does a bigger movement of oil.

### Gasoline Market

A particularly good demand for gasoline the past week was reported by the trade. The price situation does not appear any better. Gasoline is available in various sections from 15 to 18 cents a gallon, retail. No 13-cent gasoline is reported, indicating a possible wiping out of the extremely cheap material.

One marketer points to the continued surplus of retail outlets, however, as an obstacle in the way of higher gasoline prices. He says that the oil industry is inclined to regard the crude oil situation as the big factor, and to overlook the importance of the retail situation. So long as there is so large a surplus of retail stations as exist at present, he states, competitive price cutting in gasoline and lubricants is bound to occur. This competition will automatically keep prices down.

Another factor in the market, however, points out that the number of retail outlets alone would not necessarily keep the market down if owners of stations were unable to continue to buy cheap gasoline from refiners.

The fact is that cheap gasoline continues to be available in the eastern market from many sources. Eastern refiners have shown no indication of holding out for higher quotations, and tank car material from the interior also continues to be offered here in liberal quantities at reported low prices, even under those quoted in the East. U. S Motor gasoline in tank cars f.o.b. eastern seaboard refinery is quoted at 8¼ cents a gallon, unchanged from a week ago. Mid-Continent material is reported available at as low as 7¾ cents.

There is also a fairly heavy movement of 54-56 gravity gasoline coming in from the Mid-Continent, which is being blended with natural gasoline for the trade.

Marketers of gasoline in the South Atlantic territory say the situation is not especially good. Traffic from the North has not been so heavy, and the weather has been unseasonably cold, in contrast to the Middle Atlantic, where abnormally warm weather has prevailed all winter.

### Kerosene

The kerosene market is steady. Nevertheless, offerings are increasing from various sources, and this has combined with a decline in consumption during the past week to bring about a less optimistic feeling regarding the outlook. The recent reduction in the tank wagon market in Pennsylvania added to this feeling.

The weather this winter has restricted consumption of both kerosene and furnace oil below expectations of the trade. The result is that stocks, added to in anticipation of a good season, still remain abnormally high.

Water white kerosene continues to bring 7½ cents a gallon at refineries on the Atlantic Coast, in tank car lots. Prime white is available for as low as 6⅝ cents, however, it is reported in some quarters. The feeling is that unless the refined oil markets generally improve as a reaction to the crude oil situation, kerosene will go somewhat lower.

The export factor in the kerosene market, too, is not so favorable at present Bulk shipments have been almost negligible.

### Gas and Fuel Oil

The reduction in prices of gas oil and Diesel oil has already been mentioned. Bunker fuel oil is unchanged at $1.35 a barrel to the trade, lighterage 6½ cents a barrel extra. Marketing interests here do not anticipate lower prices for bunker fuel oil. Although lower prices have been announced for some of the lower grades of crude oil, no change has been recorded in the crudes directly affecting the bunker oil market, such as West Texas, California or Venezuelan crude. Freight rates are tending upward slightly. The demand is as good as could be expected. In view of all these considerations, the bunker oil market is believed on a sound basis, without any further downward revisions being necessary.

### Lubricating Oils

The lubricating oil market continues to be the most stable feature of the eastern refined oil situation. While retail price cutting has been prevalent in some sections, the refinery market continues steady. Sales are going ahead in an orderly manner, with industrial requirements in some of the large eastern manufacturing districts much improved.

The motor demand for lubricants has been exceptionally good in the Middle Atlantic section. The increased consumption has served to offset what otherwise might have proved disturbing competitive conditions.

Both "25" and "28" pale paraffin oil are in good demand at current prices of 12 and 7 cents a gallon, in tank cars, respectively. Steam refined cylinder oils are also in good demand from domestic and foreign sources.

### Paraffin Wax

Paraffin wax demand is good. Crude scale is being brought heavily by jobbers. Both crude, semirefined and fully refined wax are moving into export channels on a liberal scale. This is bringing steadiness to the price situation. No further advances have been recorded the past week, however.

### Petrolatum

The petrolatum market is firm and demand is good. Downward revision in prices seems to have temporarily been checked. Dark is available for 2 cents a pound.

### The Export Market

The oil export market here has been quiet during the past week. A bigger volume of inquiries are coming in from European sources, largely for bulk cargoes, with some good business having materialized. The current movement of products into the European market from this port continues restricted, however. There was one bulk shipment of lubricating oils, bound for France, consisting of 1,237,656 gallons, largely red and pale oils.

In the cased oil export market, the volume continues steady but with a decline in forward business. The Far East is the principal buyer. A seasonal decline in the demand for gasoline in cases in South America is now expected, which will doubtless affect the local movement to some extent. Brazil and Argentia were exceptionally large buyers of both gasoline and kerosene in cases here all winter.

Shipments of lubricating oils in barrels during the past week fell off somewhat. In fact, for the last three weeks the movement has been limited. This is attributed to increased competition from other sources, affecting the European demand somewhat, and also to increased bulk shipments reported from the Gulf Coast. The bulk movement of lubricants from Atlantic Coast ports has also been good, it is said Increased consumption in many parts of the world is enabling exporters to ship in bulk quantities instead of barrels.

The improvement noted in the paraffin wax export market in recent reviews is continuing, with the movement of refined and crude about even. It is noticeable, however, that shipments of refined wax are regaining their former lead, as a result of a better demand from Italian and Oriental sources. Spain and Portugal, customarily good markets for wax, are not drawing on the local market as they used to, due probably to new arrangements with southwestern exporters.

The petroleum asphalt export market was featured by a substantial shipment tc Australia, consisting of 1,321 tons.

Although price-cutting in the European market is not as prevalent as a few weeks ago, no new cuts being recorded, the situation is still uncertain, according to local exporters. The demand for gasoline has been cut by bad weather. Competition continues keen. There is a general feeling in both Great Britain, France and other European countries that prices have reached bottom.

The chief source of worry is the tendency toward government interference, noticed in France especially at this time. However, this is more of a cloud over the future, which of course may never materialize, than an immediate factor in the market, except in Spain, where the monopoly is being enforced. In this country, prices of all products are reported to have risen since the monopoly went into effect January 1.

Reports that the Dutch-Shell and Standard had settled their differences over Russian oil are emphatically denied in responsible quarters. At least the price war is continuing, according to reports reaching exporters. It is emphasized, however, that this is a local matter, affecting India alone, and is not spreading to other parts of the world.

The following table shows principal exports of petroleum and petroleum products from New York during the last three weeks; all figures in gallons unless otherwise noted:

| | Week Ended | | |
|---|---|---|---|
| Gasoline— | Feb. 22 | Feb. 15 | Feb. 8 |
| Cases | 200,000 | 1,105,000 | 1,540,210 |
| Kerosene— | | | |
| Cases | 100,000 | 2,049,440 | 3,284,220 |
| Lubricating Oil— | | | |
| Bulk | 1,237,656 | ..... | 613,662 |
| Barrels | 427,500 | 246,930 | 559,250 |
| Cases | ..... | 116,410 | 75,480 |
| Lubricating Grease— | | | |
| Barrels (lbs.) | 262,800 | ..... | ..... |
| Paraffin Wax— | | | |
| Bags (lbs.) | 823,900 | 2,472,140 | 471,020 |
| Barrels (lbs.) | 759,360 | ..... | 112,000 |
| Petroleum Asphalt— | | | |
| Barrels (tons) | 1,321 | 210 | ..... |

The foregoing figures include all shipments of 500 barrels, 1,000 cases, or over.

### Tanker Market and Movement

The oil tanker charter market is quiet. Rates are showing a tendency toward improvement, one fixture from Gulf to north of Hatteras being reported at 19 cents, against a low of 17½. In the Californin-Atlantic trade, however, rates continue at the bottom, and in other trade channels the situation shows no definite improvement.

New fixtures include the following:

Tanker Franklin K. Lane (Am.), San Pedro to north of Hatteras, 56 cents, March loading.

Tanker Atlantic Sun, gasoline, San Pedro to north of Hatteras, 56 cents, March loading.

Tanker Dillwyn, fuel oil, to north of Hatteras, from Gulf, 19 cents, option Cartagena, 20 cents, Tampico, 24 cents, option Charleston 3 cents less; Corpus Christi, 22 cents.

The receipts of crude and refined oil at Atlantic Coast ports by tanker for the week ended February 22 are estimated at 3,711,000 bbls., a daily average of 531,000 bbls. This compares with 2,730,000 bbls., or 390,000 bbls., daily for the week ended February 15.

The feature was the large total of imports from South America, amounting to 1,180,000 bbls., a daily average of 196,000 bbls. Imports from Mexico consisted of a single cargo of 76,000 bbls., making a daily average for the week of only 11,000 bbls.

The February imports from Mexico are expected to fall to the lowest level in many years. The first three weeks show a daily average of less than 15,000 bbls.

Receipts from the Pacific Coast for the week ended February 22 are estimated at 279,000 bbls., a daily average of 40,000 bbls. This compares with 579,000 bbls., or a daily average of 8,000 bbls., the week ended February 15.

The following table shows estimated daily average receipts of crude and refined oil by water at Atlantic Coast ports for the last three weeks; also monthly record for the last 12 months (figures in barrels):

| | Week Ended | | |
|---|---|---|---|
| | Feb. 22 | Feb. 15 | Feb. 8 |
| Gulf Coast | 311,000 | 204,000 | 357,000 |
| Pacific Coast | 40,000 | 83,000 | 42,000 |
| South America | 169,000 | 77,000 | 164,000 |
| Mexico | 11,000 | 26,000 | ..... |
| Total | 531,000 | 390,000 | 563,000 |

| Daily Averages by Months | | | | | |
|---|---|---|---|---|---|
| 1928— | Gulf | Pacific | S. Am. | Mexico | Total |
| Jan. | 340,000 | 48,000 | 137,000 | 27,000 | 552,000 |
| 1927: | | | | | |
| Dec. | 345,000 | 68,000 | 146,000 | 37,000 | 596,000 |
| Nov. | 318,000 | 62,000 | 109,000 | 42,000 | 531,000 |
| Oct. | 314,000 | 98,000 | 91,000 | 38,000 | 541,000 |
| Sept. | 336,000 | 97,000 | 99,000 | 69,000 | 601,000 |
| Aug. | 357,000 | 90,000 | 78,000 | 80,000 | 645,000 |
| July | 406,000 | 83,000 | 49,000 | 78,000 | 616,000 |
| June | 378,000 | 118,000 | 47,000 | 68,000 | 611,000 |
| May | 332,000 | 58,000 | 52,000 | 91,000 | 534,000 |
| April | 388,000 | 93,000 | 61,000 | 69,000 | 611,000 |
| March | 345,000 | 103,000 | 81,000 | 36,000 | 565,000 |
| Feb. 1 | 379,000 | 89,000 | 48,000 | 40,000 | 556,000 |

The foregoing figures are based on the carrying capacity of incoming oil-laden tankers.

# Recirculating Furnace at Refineries

## Properly Installed Gives Milder Heat Application, Greater Throughput for Same Heating Surface with Savings in Fuel

By L. A. Mekler*
*Universal Oil Products Co.*

The recirculating furnace is primarily a heating apparatus of the convection type in which the heat-absorbing surfaces are heated by a mixture of fresh products of combustion and a portion of the combustion gases that have already given off a part of their heat in their previous passage over the heat-absorbing surfaces.

In its basic conception, the recirculating furnace can be considered as a closed thermal system in which the heat-absorbing surfaces are constantly swept by a fixed quantity of products of combustion at a given initial temperature with the gases being constantly returned to the furnace and reheated before they again enter the heating zone. Gases equal in amount to that produced by the fuel burned to reheat the circulating gases are constantly ejected from the system to the stack.

The recirculating furnace is the most suitable apparatus for heating by convection where low furnace temperatures must be maintained and where only a small portion of the available heat is taken out of the gases, particularly where the maximum allowable furnace temperature is low and where the final temperature of the gases is only a few hundred degrees below their initial temperature. In such cases, recirculation not only provides a method of reducing the rather high combustion temperatures of the fuel when burned without a large amount of excess air, but, by returning to the furnace the heat content of the gases at their final temperature, recovers a large portion of heat that otherwise would have been lost through the stack.

The convection-type oil still is particularly suitable for the application of flue-gas recirculation. In an oil still, the heating of the oil is accomplished by applying to the tube surfaces a given quantity of heat of a certain predetermined

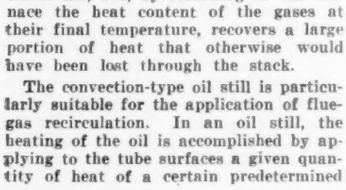


*Figure 1—Average heat content of products of combustion and air at different temperatures.*

quality, usually with the initial temperature of the gases not over 1,500 degrees Fahrenheit as measured by thermocouples placed above the tube bank. To obtain the full benefit of the heating surface of the coil, the final temperature of the gases, after passing over the coil, is kept 200 degrees to 300 degrees higher than the temperature of the incoming oil. This final temperature varies from 500 degrees Fahrenheit for a topping still with only a slight or no heat interchange before the oil enters the still, up to 1,100 degrees Fahrenheit in some cracking stills where the raw-oil feed is used for condensing the high-boiling-point fractions of the oil, and is so preheated to as high as 850 degrees Fahrenheit, as in the Dubbs cracking process.

### Combustion Gases Required

The total quantity of the combustion gases required to accomplish the heating of the oil by convection under such conditions is determined from the equation where $W_t$ = the total weight of combustion gases required

$$W_t = \frac{O}{Q_1 - Q_2} \quad (1)$$

O = the total convection heat applied to the coil

$Q_1$ = the heat content, B.t.u. per pound, of the gases at their initial temperature

$Q_2$ = heat content of the gases at their final temperature.

Figure 1 shows the average heat content of the products of combustion at different temperatures. The curve on this figure and the subsequent ones are primarily intended to show the trend rather than the numerical values of the

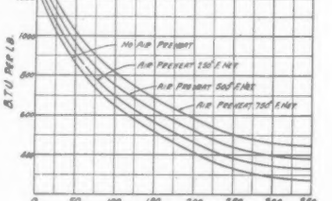


*Figure 2—Heat content of fresh products of combustion (fuel oil) with different amounts of excess air and preheat.*

quantities, but the values of Figure 1 can be used in equation (1) with an accuracy of plus or minus 5 per cent for excess air of 25 to 250 per cent.

The first requirement of convection-still operation is the reduction of Q as obtained in the fresh products of combustion to a value corresponding to the maximum allowable furnace temperature. The reduction of Q can be accomplished either by a large amount of excess air used for combustion, the common method when no recirculation is used in a convection-type furnace, or by diluting the heat content of the fresh products with a sufficient amount of returned gases with a heat content of $Q_2$ to obtain the equivalent of $Q_1$.

Figure 2 shows the heat content of fresh products of combustion obtained with different amounts of excess air and air preheat used for combustion, if no recirculation is used, and illustrates the correlation of excess air, air preheat and the value of Q for different firing conditions.

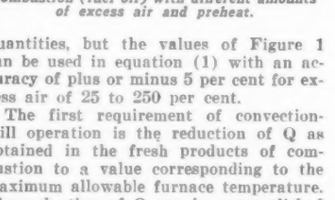


*Figure 3—Heat content of fresh products of combustion (fuel oil) with different recirculating ratios. Flue-gas temperature 1,050 degrees Fahrenheit. Excess air 50 per cent.*

Figure 3 shows the modification of the heat content of fresh products of combustion of fuel oil burned with a 50 per cent excess air, by the admixture of different amounts of flue gases at a temperature of 1,050 degrees Fahrenheit.

The recirculating ratio of Figure 3 is the number of pounds of flue gases mixed with 1 pound of fresh products of combustion and the values obtained will be true for average operation of the furnace on the Dubbs cracking process.

The curves on Figures 2 and 3 indicate that the reduction of Q to the value of the maximum allowable furnace temperature can be obtained in several ways. For example, with Q equals 390 B.t.u.

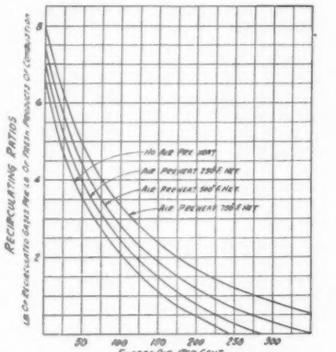


*Figure 4—Recirculating ratios for different amounts of excess air and net air preheat. Maximum gas temperature 1,500 degrees Fahrenheit. Flue-gas temperature 1,050 degrees Fahrenheit.*

per pound, this value can be obtained with no air preheat and a recirculating ratio of 4.5; with a recirculating ratio of 5, if 250 degrees Fahrenheit air preheat is used; with a recirculating ratio of 5.5 if 500 degrees Fahrenheit air preheat is used; and with a recirculating ratio of 6 if 750 degrees Fahrenheit air preheat is used. If no recirculation is used, the same value of Q can be obtained by varying the amount of excess air and the air preheat. With no air preheat, an excess air of 215 per cent will give the necessary value, as will an excess air of 250 per cent with 250 degrees Fahrenheit preheat; an excess air of 350 per cent with 500 degrees Fahrenheit air preheat and an excess air of approximately 500 per cent with an

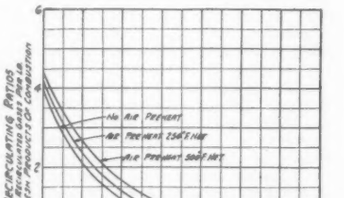


*Figure 5—Recirculating ratios for different amounts of excess air and net air preheat. Maximum gas temperature 1,500 degrees Fahrenheit. Flue-gas temperature 750 degrees Fahrenheit.*

air preheat of 750 degrees Fahrenheit.

Figures 4 and 5 show respectively the different variations that are possible in obtaining 1,500 degrees Fahrenheit maximum furnace temperature with flue-gas temperatures of 1,050 degrees Fahrenheit and 750 degrees Fahrenheit and different amounts of excess air and air preheat.

The curves of these figures are based on the heat balance in the gases before they give off any heat to the heat-absorbing surface and are the evaluation of equation :[1]

$$R = \frac{W_r}{W_t} = \frac{(Q_c - Q_1)}{(Q_1 - Q_2)} \quad (2)$$

where R = recirculating ratio.

$W_r$ = weight of recirculated gases

$Q_c$ = total heat content of fresh products of combustion, and $W_t$, $Q_1$ and $Q_2$ are as in equation (1)

From Figure 4, it is apparent that the same results can be obtained with a 2 to 1 recirculating ratio and 105 per cent excess air with no air preheat, as with 1 to 1 recirculation, 215 per cent excess air, and 500 degrees Fahrenheit air preheat, or with 1 to 1 recirculation ratio, 280 per cent excess air and 750 degrees Fahrenheit air preheat. Any other combination within the area bound by the curves of "no air preheat" and "air preheat 750 degrees Fahrenheit" will give the same operating results. If the flue-gas temperature is 750 degrees Fahrenheit instead of 1,050 degrees Fahrenheit, as assumed for Figure 4, the recirculating ratios required to obtain 1,500 degrees Fahrenheit furnace temperatures are much lower for the same excess air coefficient. The possible variations are shown on Figure 5.

The choice of a combination of recirculating ratio, amount of excess air and degree of air preheat should be determined by purely economic considerations such as the cost of fuel and the original operating and maintenance cost of the equipment.

Figures 6 and 7 show the economic balance of the gross savings obtained with different recirculating ratios and air preheat of the corresponding amounts of excess air required to bring down the values of Q to that of the desired maximum gas temperature (Figures 4 and 5). Figure 6 shows that with a flue-gas temperature of 750 degrees Fahrenheit and a maximum gas temperature of 1,500

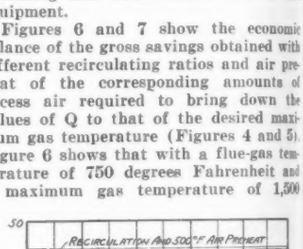


*Figure 6—Possible savings with recirculation and air preheat. Maximum gas temperature 1,500 degrees Fahrenheit. Flue-gas temperature 750 degrees Fahrenheit.*

degrees Fahrenheit, fuel has to be very expensive in order to justify recirculation of over 2 to 1. From this point the curves of savings begin to flatten out very rapidly. An increase of the recirculating ratio from 2 to 3 gives an increased saving of only 4 per cent; from 3 to 4 gives 2.5 per cent, and from 4 to 5, less than 2 per cent. With a flue-gas temperature of 1,050 degrees Fahrenheit and the same maximum gas temperature, recirculating ratios above 3 per cent cease to be economical (Figure 7).

### Savings Due to Preheat

The savings due to air preheat drop off even at a greater rate with increase of the recirculating ratio, particularly with the higher air preheat temperatures. Without recirculation, a 750-degree Fahrenheit air preheat with 1,050 degrees Fahrenheit flue gases gives a saving of 45 per cent of the total fuel used (Figure 7). With a recirculating ratio of 2 to 1, the savings due to air preheat drop to slightly over 15 per cent. With the increase of the recirculating ratio and the consequent decrease of the amount of fuel, the excess air, and therefore the

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[1]For derivation of this equation see Appendix 1.

total amount of air used, the savings due to preheating of the air, are constantly decreased until they are only slightly over 5 per cent with a recirculating ratio of 5 to 1.

The savings from the combined recirculation and air preheat per additional unit of recirculation decrease even faster than the savings from recirculation alone, when the recirculating ratio is increased. From Figure 6, with an air preheat of 250 degrees Fahrenheit, recirculating

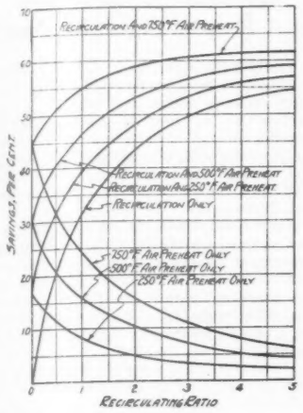



*Figure 7—Possible savings with recirculation and air preheat. Maximum gas temperature 1,500 degrees Fahrenheit. Flue-gas temperature 1,050 degrees Fahrenheit.*

ratios above 1.5 to 1 show very little increased savings for each additional unit of recirculation. With preheats of 500 degrees Fahrenheit, a recirculating ratio of 1 to 1 will be the most economical. Table 1 shows the possible savings with the different combinations of recirculation, and air preheat with a Dubbs furnace for 8,000,000 B.t.u. convection heat load and losses of 500,000 B.t.u.[2] Table 2 shows the effects of recirculation on the Dubbs process as obtained at different plants. In actual practice of the Dubbs process, the most balanced installation is obtained with recirculating ratios of between 2.5 to 1 and 3 to 1, and air preheat of from 400 degrees to 500 degrees Fahrenheit, as is indicated on Figure 7.

The mechanical design of the recirculating furnace deserves serious consideration. The method of withdrawing the flue gases from the system and their mixing with fresh products of combustion will greatly determine the combustion efficiency of the fuel burned and the temperature distribution in the furnace. The gases to be recirculated must be so withdrawn that the draft distribution in the heating chamber is not affected by the change in recirculating ratio, that is the speed of the recirculating fan, or even by the complete failure of the fan—a common occurrence with most of the older types of fans.

The whole recirculating system should be placed on a bypass to allow repairs to fan and connecting flues while the furnace is in operation.

The recirculated gases must be introduced into the furnace at a point beyond the zone of actual combustion. $CO_2$ is one of the best fire extinguishers. If large ratios of recirculation and, consequently, small amounts of excess air are used in the furnace, the flue gases will tend to retard the process of combustion on their contact with the fresh gases. This will result in considerable losses from incomplete combustion of the fuel in the combustion chamber and the complete arrest of combustion of the gases when they strike the comparatively cool heat-absorbing surfaces of the still. Up to 5 per cent CO was found in the furnace gases of one installation where flue gases came in contact with the fresh gases before combustion was complete. If a comparatively large excess of air is used and high flue-gas temperatures are maintained, the retardation of combustion is only temporary and there is a possibility of secondary combustion after a more intimate mixing of the partly

[2]See Appendix 2 for method of calculation.

**TABLE 1—OIL CONSUMPTION AND FUEL EFFICIENCY UNDER DIFFERENT OPERATING CONDITIONS**

8,000,000 B.t.u. Convection Input in the Oil; 500,000 B.t.u. Loss in Furnace

| | Fuel Required, Pounds | Heat Supplied by Fuel, Million B.t.u. | Excess Air Pct. | $CO_2$ | Loss of Heat in Flue Gases, Million B.t.u. | Oil Heating Efficiency |
|---|---|---|---|---|---|---|
| No recirculation | 1,320 | 24.8 | 230 | 4.8 | 16.3 | 32.2 |
| No recuperation | | | | | | |
| Recuperation only | 727 | 13.7 | 500 | 2.8 | 5.2 | 58.3 |
| Air preheat 800° F., net | | | | | | |
| Recirculation only | 602 | 11.3 | 25 | 12.4 | 2.8 | 70.6 |
| 4.62:1 no air preheat | | | | | | |
| Recirculation 1:1 | 717 | 13.5 | 204 | 5.1 | 5.00 | 59.2 |
| Air preheat 650° F., net | | | | | | |
| Recirculation 2.5:1 | 649 | 12.2 | 91 | 8.3 | 3.7 | 65.5 |
| Air preheat 300° F., net | | | | | | |
| Recirculation 3:1 | 580 | 10.9 | 65 | 8.5 | 2.4 | 73.4 |
| Air preheat 500° F., net | | | | | | |

burned fuel and the air admitted. Quite often the damage to the recirculating fan and air preheater attributed to corrosion from the sulphur of the gases and the water leaks from the water-cooled fan bearings is due to secondary combustion within the fan and preheater itself because of much more thorough mixing of the gases and the air on their passing through the fan and the preheater.

**Table 2.—Effect of Recirculation and Air Preheat on Still Operation**

90—4" Tube Still

| Fans— | On | Off |
|---|---|---|
| R. O., bbl. per hour | 77.5 | 58.3 |
| Fuel—gas cu. ft. per hour | 17,480 | 20,733 |
| Fuel ratio, oil equivalent, per cent | 5.16 | 8.16 |
| Furnace above tubes °F. | 1407 | 1495 |
| Furnace below tubes °F. | 970 | 973 |
| Fan discharge, °F. | 831 | .... |
| Preheater discharge °F. | 352 | 172 |
| Stack | 583 | 807 |
| Per cent $CO_2$ | 9.0 | 4.0 |
| $O_2$ | 4.5 | 15.0 |
| Furnace efficiency, calculated | 69.16 | 44. |

62—4" Tube Still

| Fans— | Off | On | On* |
|---|---|---|---|
| R. O., bbl. per hr. | 35.6 | 39.6 | 52.1 |
| Fuel, bbls. per hr. | 2.34 | 2.12 | 3.15 |
| Fuel ratio | 6.57 | 5.38 | 6.03 |
| Furnace above tubes, °F. | 1568 | 1565 | 1560 |
| Furnace below tubes, °F. | 969 | 985 | 1059 |
| $CO_2$ | 6 | 11.5 | 6.5 |

72—5" Tube Still

| Fans— | On | Off |
|---|---|---|
| R. O., bbl. per hr. | 76.5 | 57.4 |
| Furnace above tubes, °F. | 1,500 | 1,565 |
| Furnace below tubes, °F. | 1,020 | 1,010 |
| $CO_2$ | 9.2 | 3.8 |
| Fuel ratio | 5.42 | 8.67 |

*Preheater bypassed, to allow for larger throughput unit operated beyond the capacity of the recirculating system.

The method of mixing of the flue gases with the fresh products of combustion affects not only the combustion process but the heat distribution within the still as well. The recirculated flue gases are from 450 degrees to 750 degrees Fahrenheit cooler than the operating furnace temperature and usually over 1,000 degrees Fahrenheit cooler than the fresh products of combustion. If the mixing of

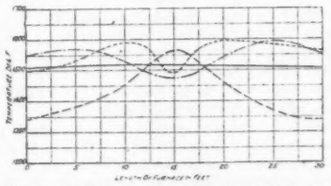


*Figure 8—Effects of mixing fresh and recirculated gases on furnace temperature distribution.*

the fresh products of combustion and the recirculated gases is not intimate, the furnace temperatures will differ in the different parts of the still.

Figure 8 shows the temperature distribution over a tube bank in the recirculating still, with various degrees of intimacy of mixing of the products of combustion with the recirculated gases. With poor mixing the difference was more than 200 degrees Fahrenheit from the center to the ends. Proper mixing gave a difference of less than 10 degrees Fahrenheit.

The degree of mixing affects mainly the temperatures above the tube bank. The temperatures below the tube bank are affected by the method of withdrawing the gases from the furnace and the point at which the recirculated gases are taken from the flue.

### Withdrawing Flue Gases

Figure 9 shows a good arrangement of withdrawing the flue gases for recirculation. The fan is located between the furnace and the stack, and since the recirculating system is a closed system within itself the failure of the fan does not upset the draft and the temperature distribution along the length of the furnace. This arrangement uses only one fan, which is also an advantage in that

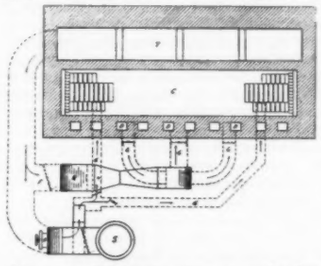


*Figure 9—Schematic plan of recirculated still. Recirculating fan suction between furnace and stack.*

the recirculating system is either fully on or off.

Figure 10 shows a one-fan arrangement in which the flue gases to be recirculated are withdrawn from an end opposite to that acted upon by the stack pull. The disadvantage of this arrangement is the complete disturbance of draft distribu-

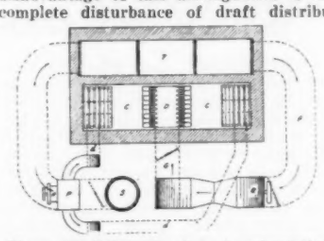


*Figure 10—Schematic plan of recirculating still. Recirculating fan suction on end opposite to that acted upon by the stack.*

tion in the furnace with the failure of the recirculating fan, unless dampers are provided under the tube bank to redistribute the draft along the length of the furnace.

Figure 11 shows a rather popular arrangement of two fans, each drawing from an opposite end of the furnace with the stack acting either on the center of the furnace as shown, or with one on the end, which is even more common. This arrangement, as that on Figure 10, has the disadvantage of disturbance of the draft with the failure of either of the fans.

T=tube chamber
C=combustion chamber
D=recirculated flue-gas distributor
F=recirculated flue-gas fan intake
G=recirculated flue-gas fan discharge
R=recirculated flue-gas fan
A=cold-air fan
P=air preheater
S=stack
d=preheated air duct

The most common methods of returning the products of combustion to the furnace are shown on Figures 12 to 15.

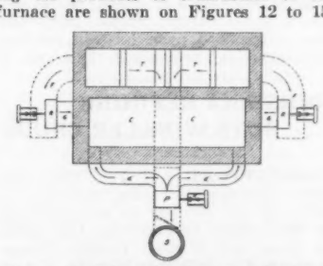


*Figure 11—Schematic plan of recirculated still. Two-fan arrangement.*

Figure 12, which is a section of the arrangement of Figure 10, shows a method by which the recirculated flue gases are introduced into the center part of the combustion chamber through an arch and are distributed approximately at right angles to the natural path of the fresh products of combustion. The introduction of such an arch resulted in a much more even distribution of the furnace temperatures than were obtained with center flue-gas discharge without the arch. The only disadvantage of such an arrangement is that with the fan down considerable excess air has to be

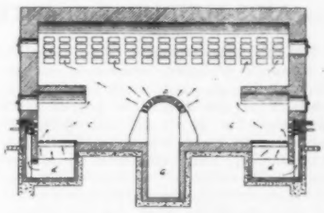


*Figure 12—Schematic section of recirculating still. Recirculated flue gas distribution through arch.*

introduced into the recirculated flue gas duct to obtain an even temperature distribution along the tube bank.

Figure 13 shows a multiple flue-gas inlet method of mixing and is cross sec-

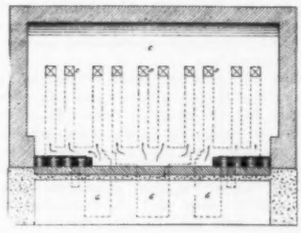


*Figure 13—Schematic section of recirculating still. Multiple wall flue discharge of recirculated flue gases.*

tion of scheme shown on Figure 9. Except for rather high construction cost and somewhat weaker wall, this method is preferable to the method shown on Figure 12. The natural tendency of the cooler gases to descend will produce considerable eddies in the furnace and assist in their mixing with the products of combustion. By manipulating dampers a, b and c, the amount of the recirculated gases delivered to each discharge flue in the wall can be controlled, and an even temperature distribution much more easily obtained than with scheme shown on Figure 1.

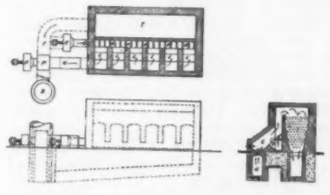


*Figure 14—Side-fired recirculating still.*

Figure 14 shows the most suitable furnace arrangement for a recirculating convection still. This still is side fired in a multiplicity of fireboxes, which allow good control of the distribution of the fresh products of combustion, considerably better than the one obtained with the end-fired furnaces. The recirculated flue gases are withdrawn at one point between the stack and the furnace and are distributed through a tile-covered flue at an angle to the path of the fresh products of combustion, which induces the most thorough mixing. As a secondary consideration, the recirculated products of combustion will act as a protection for the partition wall of the furnace from the radiant heat in the combustion chambers.

### Novel Method

Figure 15 shows a rather novel method of mixing the fresh products of combustion and the recirculated gases. This arrangement not only induces good mixing of the fresh and recirculated gases but reduces the amount of radiant heat that is applied to the brickwork for

(Continued on Page 217)

# Brief Items for Petroleum Refiners

## NEW CANADIAN TARIFF AIDS SUNBURST PLANTS

CHATHAM, Ontario, Feb. 25.—The new tariff changes announced in the Federal budget last week include the transfer to the duty free list of crude petroleum not in its natural state, .725 specific gravity or heavier at 60 degrees temperature, when imported by oil refiners to be refined in their own factories. The duty-free privilege will continue until July 1, 1931, when, in the absence of specific provisions to the contrary, the duty will become three-tenths cent preferential, four-tenths cent intermediate and one-half cent general.

Crude oil in its natural state has been imported duty free for some years but tops have been dutiable. Refineries at Lethbridge, Edmonton and Coutts, in Alberta, have for some years been operating on tops from skimming plants in the Montana Field, and these refiners have been urging tariff concessions on their raw materials.

This will give the small refiner of the Sunburst, Mont., district an excellent market for his gasoline tops. Since the Sunburst crude contains some sulphur, the gasoline and kerosene obtained by the small skimming plants is cloudy and has a disagreeable odor. The small skimming plant does not desulphurize the stock as does the regular refiner.

With the duty off on crude and toppings, the skimming plant can run its crude through a still, ship the light cuts and then sell the fuel oil locally. The tops will bring in a nice profit for the fuel oil more than pays for average plant operation of this kind.

## MARKETING CHANGES IN CHICAGO DISTRICT

CHICAGO, Feb. 25.—Oil Jobbers Refining Co. has been organized with a capital of $10,000 to deal in petroleum products. The address of the new company is at Ferdinand Street and the Chicago Belt Railway. Those interested in the new organization are Oliver W. Fitts and William G. McCreary.

American Fuel Oil & Gas Co., Chicago, has changed its name to the American Fuel Oil Corp. The address is 3711-13 South California Avenue, Chicago.

Hawk Petroleum Co., 549 West Washington Street, Chicago, to deal in petroleum and petroleum products. Incorporated for $10,000. R. J. Hanson and H. W. Rasmussen are the principals named in the organization.

### CHICAGO OIL MEN ELECT

CHICAGO, Feb. 25.—The annual election of officers of the Chicago Oil Men's Club was held today. The following officers were elected: Charles S. Rosenthal, Apex Motor Fuel Co., president; B. L. Majewski, Shaffer Oil & Refining Co., vice president; Milton Keim, Apex Motor Fuel Co., secretary; R. S. Doepel, Braun Brothers, Niles City, treasurer. The new vice president extended an invitation to all oil men to join the Illinois Petroleum Marketers Association.

### EXPLOSION AT TOLEDO PLANT

TOLEDO, Ohio, Feb. 27. — One man was killed and several were seriously injured in an explosion Sunday night at the local refinery of the Sun Oil Co. The explosion, the cause of which is not known, was followed by a fire with a large property loss. Officials of the company today were conducting an investigation to determine the cause of the fire and the extent of the property damage. It is not expected the fire will seriously affect the operation of the plant.

## ILLINOIS DECISION MAY BRING SAME ACTION IN OTHER STATES

States Attorney General Carlstrom, of Illinois, says that the State will accept the decision of the State Supreme Court declaring the gasoline tax illegal and that in a few days announcement will be made regarding the refunding of the amount collected under the law. Oil companies and large consumers who were preparing to take legal steps to secure a refund will await the action of the attorney general. One company, the Osborn Oil Co. of Rockford has filed notice of such a suit claiming $25,000 as due it.

Several prominent attorneys claim that the decision of the Illinois court finding the law contrary to the Federal constitution may pave the way to actions to declare the gasoline tax illegal in other states under the constitution. The Illinois courts ruled that the tax is illegal because that while the distributors pay the tax, any person who can show that the gasoline purchased was not used for vehicles on the state roads may obtain a refund. This provision, it is claimed, makes the tax an occupational tax, which is contrary to the Federal constitution. The provision of the constitution, which is claimed to be infringed by this method of collection and refunds, is that which provides that all persons shall have equal protection under the law and that no one shall be deprived of his property without due process of law.

While the refunding of the tax will be a simple matter in the case of distributors, there will be great difficulty in making the refund to the small individual consumers. One suggestion made is that the price be reduced at the stations until a total sum had been repaid to motorists equal to that refunded to each company, but this suggestion is open to the objection that it might be taken as a general reduction and thus unsettle the scale.

## TO ERECT LUB PLANT IN THE HOSSTON FIELD

SHREVEPORT, La., Feb. 25.—Construction of a 600-bbl. daily capacity plant in the Hosston Field of northern Caddo Parish has been started by the Bayou State Refining Co., a subsidiary of the Bayou State Oil Corp. of Shreveport, which is to be built at a cost of $240,000 and in operation by May 1. It will be a lub plant using one unit of the Schultz vacuum process, patent on which is owned by the Red River Refining Co., of Chicago. The installation is by the Graver Corp., of Chicago. A unique feature of the plant is that it will be electrically operated. Only four men exclusive of common labor will be required to operate it. J. F. Knox will be superintendent.

Bayou State Oil Corp.'s production, amounting to 18,000 to 20,000 bbls. per month, will be run with such outside production as may be needed from time to time. Hosston heavy crude which it will run exclusively possesses properties not found in either of the other crudes produced in this territory in that it has a naturally low cold test, 10 to 40 below zero with a naturally high flash and fire test, with a recovery of 45 per cent lub stock. It has refined to a colorless, tasteless, odorless medicinal oil. Standard Oil Co. of Indiana has been taking it under contract for this purpose for the past four or five years, running an average of 140 bbls. daily in the manufacture of this mineral "castor oil."

For several years production has been shipped to Red River Refining Co., at Chicago and Standard Oil Co. of Indiana at Whiting and others, but to obtain a wider market Bayou State Oil Corp. determined upon its own refinery and the present program is the result.

## LOUISIANA REFINING BUYS WINKLER CRUDE

SHREVEPORT, La., Feb. 25. — The largest contract for crude executed recently by any refinery in this territory has been signed by Louisiana Oil Refining Corp. and Winkler County, Texas, producers for 2,000,000 bbls. of West Texas crude at 60 cents per barrel. The crude is for delivery during the year, though it may be filled in nine months. The material is to be delivered to the Louisiana's Gas Center refinery in Shreveport, which is now running this stock exclusively, receiving from 35 to 55 cars per day since January 1. The Louisiana company has also contracted with Simms Oil Co. and Sinclair Oil & Gas Co. for their Homer output, terms and conditions of each of these contracts not being given, except that the Simms and Sinclair purchases are for a six-month period.

It is reported also that Standard Pipe Line Co. and the Gulf Refining Co. have contracted for the former to take all the latter's Louann (Smackover light) production, amounting to approximately 10,000 bbls. for a period of 90 days with option for a 90-day renewal, but confirmation of details was not obtainable today.

## ST. LOUIS PETROLEUM CLUB NAMES OFFICERS

E. J. Keitel, of the Columbia Oil Co., was elected president of the St. Louis Petroleum Club at the annual meeting of the club. The annual dinner dance of the club was held Saturday, February 25, at the Missouri Athletic Club.

Other officers elected for the coming year were as follows: A. C. Bauer, A. C. Bauer Oil Co., vice president; M. G. Boylan, Frier-Sturgies Co., treasurer; R. F. Leinberger, Blackmer Pump Co., secretary; and J. G. Brueckmann, Brueckmann Cooperage Co., sergeant-at-arms.

The following in addition were elected to the governing board: William Kleissle, J. D. Streett & Co.; D. E. Lavin, Roxana Petroleum Corp.; R. E. Gurley, Gurley Oil Co.; W. E. Espy, Mid-Continent Petroleum Corp.; F. A. King, Metal Hose & Tubing Co.; and William Heintz, Heintz Steel & Manufacturing Co.

## PYOTE SKIMMING PLANT TO RUN WINKLER CRUDE

J. D. Wrather and associates of Amarillo, Tex., will immediately start the construction of a skimming plant at Pyote, in West Texas, according to an announcement of the past week. Those interested in the construction of the plant have contracted for 1,000,000 bbls. of Winkler County crude oil for delivery over two years.

It is expected that the plant, which will have a capacity of 2,000 bbls. daily, will be ready to operate by June 1. Mr. Wrather is president of the Amarillo Producers & Refiners Corp., which operates a skimming plant at Isom in the Panhandle area of Texas.

## Louisiana-Arkansas Refiners Constantly Improve Operations

SHREVEPORT, La., Feb. 25.—Half a million dollars or more has been spent by refiners in Shreveport and El Dorado during the last two or three months in repairs, alterations and improvements on their plants which increased their output and lowered production costs or at least held them stationary while their output was increased.

Shreveport Producing & Refining Co. has just begun work on a $250,000 improvement program which includes installation of an additional pipe still for its cracking plant, additional tankage, etc. The work is to be completed March 15, and will materially increase the rated capacity.

Dixie Oil Co. is rebuilding an old plant at Superior, 4 miles south of Vivian, and will make a 1,500-bbl. topping plant of it to run Pine Island crude, expecting to have it in operation some time next month. The Lion Oil Refining Co. has completed a repair job costing approximately $100,000, replacing two of a battery of shell stills which exploded last fall the resulting fire doing considerable damage to the plant, and the Root Refineries, Inc., have completed repairs and replacements on a Dubbs unit damaged when a fire followed blowing out of a nipple. The company has also completed a 6-inch pipe line to the Champagnolle Field, 12 miles northeast of El Dorado.

Kettle Creek Refining Co. has shut down its old cracking unit and shell stills and substituted a tube still installation through which it is running 60,000 bbls. of crude per month with an increased recovery of better quality products. At the same time the old equipment was shut down in El Dorado, their Ardmore plant also was shut down. The El Dorado cracking units will probably not be put back in service this year, though it is possible that the Oklahoma plant will.

The Macmillan Petroleum Products Co., which took over the plant of the old Newark Refining Co., at El Dorado scrapped all the old equipment save one old tube still and installed the Boner and Sheldon process and are specializing in lubs rather than motor fuel and burning oils, running 1,500 bbls. of Smackover crudes daily. Results obtained thus far have been entirely satisfactory but experiments are still under way to determine optimism operating conditions.

On the same lot with the Macmillan plant, James B. Berry & Sons, of Chicago, have an asphalt plant running flux from the Macmillan refinery, said to be the only plant of its sort manufacturing asphalt from Smackover crude. The Louisiana Oil Refining Co. has just completed the installation of Koch-Winkler towers on the cracking stills at their Bossier City refinery and these are expected to materially increase its capacity.

### HOLDING SALES MEETINGS

CHICAGO, Feb. 25.—The Shaffer Oil & Refining Co. is holding a series of sales meetings in preparation for the coming season. Meetings have been held at various points, one at the Chicago offices on Wednesday and Thursday of last week and another at Oklahoma City, Okla., on February 26. Over 300 of the organization's department managers and principal executives have met for a general discussion of the outlook. Among the topics considered were the best means of holding the present volume of business at less cost or increasing the sales with no additional costs through rigid economy, safety line in credits, the pushing of collections and economical sales promotion.

# Natural Gas Developments

## Perfect New Method Of Testing Gas for Its Gasoline Content

By W. F. Fulton*
*Chief Chemist, The Palmer Corp.*

A test for the gasoline content of gas was worked out in order that we may know the maximum amount of gasoline in any given gas, also the maximum amount that we could extract from that gas and sell as commercial gasoline. We found that the standard test for gasoline was very poor indeed. We could not tell from it just what quantity of gasoline or the amount that would have to be condensed with a compressor with our type plant. We make 250 gallons per 1,000,000,000 on gas that showed 60 gallons per 1,000,000 by the standard test. On the other gases we made only twice as much as the test showed. In other words, the composition of the gas, the composition of the gasoline removed and the chemical character of the gasoline changed in different fields so that we had to devise a test that would give us the information we required.

**Known Quantity**

After trying pressure distillation of the charcoal, liquefaction of the vapors with carbondioxide, snow and ether, and other methods, we found from actual fractionation of the vapors removed from the charcoal that a known quantity of gasoline was in the gas, and this figure checked with our plant production. However, this method is too long and hard for everyday use, so we worked out the following test which gives the same results.

Three hundred cc of charcoal is saturated with the gas to be tested in the following quantities: If the gas runs dry to 250 gallons per 1,000,000 we pass 15 cubic feet of gas through the charcoal in one hour; if the gas runs from 250-500 gallons per 1,000,000 we pass 10 cubic feet per hour and if the gas runs from 500-1,000 gallons per 1,000,000 we pass only 5 cubic feet per hour. The test lasting for one hour in all cases.

**Not Completely Saturated**

The charcoal from the above procedure is not completely saturated as it is in the four-point test, but it contains all of the light hydrocarbons as well as the heavy hydrocarbons in that portion of gas passed through it. Oversaturation of the charcoal drives out the light fractions of the gasoline and they are lost. This is true in most cases when the four-point test is used. However, in the four-point test, the gasoline condensed will be stable and a larger amount will condense, due to the fact that the vapor from the charcoal is more concentrated and contains no light fraction to lower the critical temperature, thereby condensing easier.

The charcoal is placed in a 1,000-cc Engler flask and 150 cc glycerin is added. The flask is attached to a glass condenser tube 16 inches long and one-fourth inch in diameter. This is enclosed in a glass jacket 3 inches in diameter and 10 inches long, the condenser being vertical. The end of the condenser is inserted into a 50-cc graduate cylinder, which is enclosed in an ice pack. The vapors that do not condense in the cylinder are conducted to a 50-c.c. cylinder containing 40 cc of absorption oil (the 40.5 cc being used so that when the oil is cooled to 32 degrees Fahrenheit the volume will be 40.0 cc of oil in the cylinder.

The cylinder is also packed in ice, and the vapors absorbed until the volume reads 45 to 46 cc. Then the cylinder is removed and another cylinder placed to catch the vapors, containing 40.0 cc of oil which is not cooled down but left at atmospheric temperature, and at the end of the distillation the sum total of the two rises in volume of the cylinders plus the gasoline in the receiving cylinder are added together and used as the volume of gasoline recovered (without weathering.) The gasoline caught in the iced cylinder represents the light gasoline in the gas, the second cylinder represents the intermediate gasoline and the condensate in the receiving cylinder represents the low gasoline in the gas.

We find the above test will apply to any gas low pressure of high pressure gas, will give results within a few gallons per 1,000,000 of what an efficient plant will make, also designates the amount of gasoline that will have to be condensed with a compressor. And, as this is all we wish to know we feel that the test is the best that can be used to determine the gasoline content of gas. We do not say that all plants will make as much gasoline as the test shows, but they should make as much gasoline as the test shows A plant that does not condense the vapors from the still under pressure does not recover all of the gasoline from the gas because the vapors from the still will always contain enough wild gases to carry off a large amount of good gasoline which can be recovered by condensing under pressure.

We feel that our special test is superior for plant control or gas testing where it is necessary to know the total volume of gasoline to be handled before the plant is built. In the Richland Field the gas shows 245 gallons per 1,000,000 by the standard charcoal test, but by our test it shows 422 gallons per 1,000,000, or 177 gallons per 1,000,000 more gasoline, which an efficient plant will make into commercial gasoline without any trouble whatever.

*From Natural Gas, published by the Natural Gas Department of the American Gas Association, Inc.

## NEW NATURAL GASOLINE PLANTS BEING ADDED IN SEMINOLE AREA

Natural gasoline production in the Seminole Field of Oklahoma has continued to increase over the past two months but manufacturers have had to extend their gathering systems in some cases in order to maintain a supply to keep production up to the capacity of their plants. While this practice of extending lines is general some manfacturers have done this in order to connect up new production.

Augmenting these lines to supply the old plants, several new plants are being built in the Little River Pool. The Forrest E. Gilmore Co. has started work on a 10,000-gallon plant on the Blackwell lease and plans have been made to increase this should new production come in. The Sinclair Oil & Gas Co. is building a booster station in the Little River Pool which is expected to make from 5,000 to 10,000 gallons daily, but its function will be to pump the gas from the field to the older plants centrally located, for complete stripping.

The present production is shown as 815,000 gallons net daily and is an increase over the past two months of about 30,000 gallons. The gross production is well above 850,000 gallons at present. Unless a new field is found in the general location of these pools, it is not likely that many additional plants will be put in and the present production is very near or at its peak. The prolonged flowing of the wells by gas has been responsible for the continued high production and the stability of the gas supply has proven a surprise to many who predicted a short life for the field. The long life thus far has made manufacturers less skeptical of the future of the field and should new production be found as the new locations are developed there probably will be little hesitancy in putting in adequate and permanent equipment at once.

Better prices are also conducive for the more intense development of new fields and with the summer months ahead when consumption is high and production per plant is usually lower than at present much attention is being given every well tending to extend the present pools. Also in those cases where time did not allow manufacturers to put in all of the equipment needed to bring their plants up to their most efficient operating basis when originally built they are now adding those things. This fact also shows the confidence placed in the future of the field as a source of rich gas.

**Present Natural Gasoline Production in the Seminole Field**

| | Gallon Daily |
|---|---|
| Amerada Petroleum Co. | 30,000 |
| Barnsdall Oil Co. | 30,000 |
| Carter Oil Co. | 160,000 |
| Crosbie Oil Co. | 10,000 |
| Empire Gasoline Co. | 145,000 |
| Forrest E. Gilmore Co. | 24,000 |
| Gypsy Oil Co. | 5,000 |
| Independent Oil & Gas Co. | 12,000 |
| Magnolia Petroleum Co. | 11,000 |
| Pure Oil Co. | 40,000 |
| Roxana Petroleum Co. | 22,000 |
| Sinclair Oil & Gas Co. | 286,000 |
| Victor Gasoline Co. | 40,000 |
| Total | 815,000 |

### ONTARIO GAS LEGISLATION

CHATHAM, Ontario, Feb. 25.—A bill has received its second reading in the Ontario legislature which provides that companies selling a mixture of natural and artificial gas may, on their own request and that of the municipalities concerned, be brought under the terms of the Natural Gas Conservation Act. This act gives the natural gasoline referee, Hon. G. F. Henderson, rate fixing powers.

### OHIO MARKETERS MEET IN SPRING CONVENTION

COLUMBUS, Ohio, Feb. 25.—Over 400 oil men registered at the spring convention of the Ohio Petroleum Marketers Association which closed a three-day meeting here yesterday. The greater part of the three days was spent in business sessions at which the members listened to addresses on salesmanship and market conditions as they apply to the oil industry. A number of equipment companies had exhibits at the meeting.

Among the speakers were Alvin E. Dodd, manager of the Department of Domestic Distribution of the United States Chamber of Commerce; B. N. Anglin, vice president of the Indian Refining Co.; Judge E. Allen Frost, counsel of the Outdoor Advertising Association; Harry B. Fuller, Cleveland attorney; Harry L. Frueauff, of the Henry L. Doherty & Co., and W. R. Boyd, Jr., of the American Petroleum Institute.

J. L. Marsh of Youngstown was elected president of the association for the coming year succeeding W. F. Burke of Cincinnati. At a meeting of the new board of directors, W. A. Milne of Columbus, Ohio, was re-elected executive secretary.

### NEBRASKA MEETING

The Nebraska Independent Oil Men's Association will hold its spring meeting at Kearney, April 18 and 19. The meeting will be held at the Hotel Kearney. C. M. Sutherland, secretary of the association, is arranging the program.

### BRITISH-AMERICAN CO. IN EXPANSION PROGRAM

CHATHAM, Ontario, Feb. 25.—The British American Oil Co.'s past policy of continuous expansion in its refining and marketing facilities will be continued during 1928, according to an announcement by executives at the twenty-first annual meeting held at Toronto. Over $2,000,000 was spent in improvements during 1927, according to a report made at the annual meeting. The company's two refineries were improved and its distributing facilities until now has approximately 600 units.

The company had just closed a seven-year period in which the group insurance of employes prevailed, wholly at the expense of the company. The experience was stated to be of a most satisfactory character, alike to the employes and the company itself. An internal organization covering cases of sickness or accident to refinery employes where the Workmen's Compensation Act did not apply, had been of great benefit.

To this fund the employes contributed half of the cost, and the company half. For many years past a co-operative committee had been functioning between the refinery workers and the company, consisting of equal representatives of both parties.

It was stated that the Dominion Bureau of Statistics for January, 1928, gave the present price of gasoline at over 20 per cent less than the average price in 1913. This was due not only to the great competition following upon overproduction of crude petroleum, but also to the fact that newer methods of refining had made possible a much larger volume of gasoline from the same quantity of crude oil. Thus notwithstanding the tremendously increased costs of working in every direction the price of this leading commodity was maintained on a lower level, as noted.

The directors were all re-elected. At a subsequent meeting of the board the following officers were re-elected: S. R. Parsons, chairman of the board; A. L. Ellsworth, president; C. L. Suhr, Oil City, Pa., vice president; P. W. Binns, secretary; and J. C. Millar, treasurer.

### AMERICAN OIL MEN'S SPRING CONVENTION

"Profits for 1928" will be the subject of each speaker who takes part in the spring convention of the American Oil Men's Association to be held March 6, 7 and 8, at the Stevens Hotel, Chicago. Each speaker will discuss some particular angle of the general subject, according to James A. Gilmore, secretary of the association.

B. H. Anglin, vice president of the Indiana Refining Co., will discuss certain practices in the marketing of refined products. A. S. Close, president of the association and vice president of the Hickok Producing Co., of Toledo, will also speak on marketing practices. Mr. Close's company sells over 50,000,000 gallons of gasoline yearly.

Other speakers include R. S. Williams, president of the Williams Oil Co., Muncie, Ind., and president of the Indiana Independent Petroleum Marketers Association; G. W. Benedict and L. F. Marshall, lubricating engineers of the Weaver Manufacturing Co., Springfield, Ill.; and J. P. Nicholson, president of the Klean-Rite Auto Laundry Co. of Chicago, Ill.

In place of the annual banquet and dance, Mr. Gilmore has arranged for an informal dinner the evening of March 7 to be interspersed with music and entertainment. The film, "The Story of Petroleum," prepared by the American Petroleum Institute, will also be shown.

# REFINERY AND CRUDE PRICES

**Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields**

## GASOLINE AND NAPHTHA

| | Feb. 28 | | Feb. 21 | | Feb. 14 | |
|---|---|---|---|---|---|---|
| **OKLAHOMA (Group 3)—** | | | | | | |
| 50-52 450 endpoint | .05½ | | .05½ | | .05⅝ | .05½ |
| 56-58 450 endpoint | .05½ | | .05½ | | .05½ | |
| 58-60 450 endpoint | .05¾ | | .05¾ | | .05⅞ | .05¾ |
| *58-60 437 endpoint (U. S. Motor) | .06168 | | .06211 | | .061042 | |
| *60-62 437 endpoint | .06423 | | .06413 | | | |
| *60-62 400 endpoint | .06705 | | .06690 | | .065 | |
| *64-66 375 endpoint | .07170 | | .07250 | | .070 | |
| 68-70 360 endpoint | .07¼ | | .07¼ | | .07⅛ | .07¼ |
| 64-66 437 endpoint (blend) | .06⅛ | .06¼ | .06⅛ | .06¼ | .06 | |
| **KANSAS—** | | | | | | |
| 58-60 437 endpoint (U. S. Motor) | .06¼ | .06⅜ | .06¼ | .06⅜ | .06⅛ | .06⅜ |
| **NORTH TEXAS—** | | | | | | |
| 56-58 450 endpoint | .05½ | | .05½ | | .05⅜ | .05½ |
| 58-60 450 endpoint | .05½ | | .05½ | | .05⅜ | .05½ |
| 58-60 437 endpoint (U. S. Motor) | .06 | .06¼ | .06 | .06¼ | .06 | |
| 60-62 400 endpoint | .06⅜ | .06½ | .06⅜ | .06½ | .06⅜ | .06½ |
| 64-66 390 endpoint | .06⅝ | | .06⅝ | | .06⅝ | |
| 64-66 375 endpoint | .06¾ | .07 | .06¾ | .07 | .06¾ | .07 |
| 68-70 360 endpoint | .07 | .07¼ | .07 | .07¼ | .07 | .07⅛ |
| 64-66 437 endpoint (blend) | .06⅛ | .06¼ | .06⅛ | .06¼ | .06 | |
| **NORTH LOUISIANA—** | | | | | | |
| 58-60 437 endpoint (U. S. Motor) | .06⅜ | .06½ | .06⅜ | .06½ | .06¼ | .06½ |
| **ARKANSAS—** | | | | | | |
| 58-60 437 endpoint (U. S. Motor) | .06½ | | .06½ | | .06¼ | .06½ |
| **PENNSYLVANIA—** | | | | | | |
| 52-54 Naphtha | .07½ | .07¾ | .07½ | .07¾ | .07½ | |
| 54-56 Naphtha | .07½ | .07¾ | .07½ | .07¾ | .07½ | |
| 58-60 Gasoline | .07¾ | .08 | .07½ | .07¾ | .07½ | .07¾ |
| 60 Gasoline | .08 | .08¼ | .08 | .08¼ | .08 | .08¼ |
| 62 Gasoline | .08¼ | .08¾ | .08½ | .08¾ | .08¼ | .08¾ |
| 64 Gasoline | .09 | .09¼ | .09 | .09¼ | .09 | .09¼ |
| **CALIFORNIA—** | | | | | | |
| 58-60 437 endpoint (U. S. Motor) domestic | .08 | .08½ | .08 | .08½ | .07 | |
| **CHICAGO DISTRICT (Based on Group 3)—** | | | | | | |
| 50-52 450 endpoint (Naphtha) | .05½ | .05⅝ | .05½ | .05⅝ | .05½ | .05⅝ |
| 56-58 450 endpoint | .05⅝ | .05⅞ | .05¾ | .06 | .05⅝ | .05¾ |
| 58-60 437 endpoint (U. S. Motor) | .06⅛ | .06¼ | .06⅛ | .06¼ | .06 | .06⅛ |
| 60-62 400 endpoint | .06½ | .06⅝ | .06½ | | .06½ | |
| 64-66 375 endpoint | .07 | .07⅛ | .07 | | .07 | |
| 68-70 360 endpoint | .07¼ | .07⅜ | .07¼ | | .07¼ | .07⅜ |
| 64-66 437 endpoint (blend) | .06⅛ | .06¼ | .06⅛ | .06¼ | .06 | .06⅛ |

*Weighted average prices February 27 as reported by representative refiners. Sales to jobbers only.

## NATURAL GASOLINE

| | Feb. 28 | | Feb. 21 | | Feb. 14 | |
|---|---|---|---|---|---|---|
| **OKLAHOMA (Group 3)—** | | | | | | |
| Grade A, 72-79.9, 375 e.p., rec. 90% | .05½ | | .05½ | .05⅝ | .05½ | .05⅝ |
| Grade AA, 80-87.9, 375 e.p., rec. 90% | .05⅝ | .05½ | .05½ | | .05⅝ | |
| Grade B, 76-83.9, 375 e.p., rec. 85% | .04½ | | .04⅝ | .04¾ | .04¾ | |
| Grade BB, 84-92, 375 e.p., rec. 85% | .04¼ | .04⅜ | .04½ | .04⅝ | .04¾ | |
| Grade C, 80-92, 375 e.p., rec. 78% | .04⅛ | .04¼ | .04¼ | .04½ | .04¼ | |
| **NORTH TEXAS—** | | | | | | |
| Grade A, 72-79.9, 375 e.p., rec. 90% | .05½ | | .05½ | | .05½ | .05⅝ |
| Grade AA, 80-87.9, 375 e.p., rec. 90% | .05⅝ | | .05½ | | .05½ | |
| Grade B, 76-83.9, 375 e.p., rec. 85% | .04½ | | .04⅝ | .04¾ | .04¾ | |
| Grade BB, 84-92, 375 e.p., rec. 85% | .04¼ | | .04½ | .04⅝ | .04¾ | |
| Grade C, 80-92, 375 e.p., rec. 78% | .04¼ | | .04¼ | .04½ | .04½ | |
| **NORTH LOUISIANA—** | | | | | | |
| Grade AA, 80-87, 375 e.p., rec. 90% | .05⅝ | | .05⅝ | .05¾ | .05½ | |
| Grade BB, 84-92, 375 e.p., rec. 85% | .04¾ | .04⅞ | .05 | | .05¼ | |
| Grade C, 80-92, 375 e.p., rec. 78% | .04½ | .04⅝ | .04⅝ | .04¾ | .05⅛ | |
| **CALIFORNIA—** | | | | | | |
| 75-85, 375, 390 endpoint | .07 | .07½ | .07 | .07½ | .07½ | .08 |
| **CHICAGO DISTRICT (Based on Group 3)—** | | | | | | |
| Grade A, 72-79.9, 375 e.p., rec. 90% | .05½ | | .05½ | | .05½ | |
| Grade AA, 80-87.9, 375 e.p., rec. 90% | .05⅝ | | .05½ | | .05½ | .05⅝ |
| Grade B, 76-83.9, 375 e.p., rec. 85% | .04½ | | .04⅝ | | .04¾ | |
| Grade BB, 84-92, 375 e.p., rec. 85% | .04¼ | .04⅜ | .04½ | .04⅝ | .04¾ | |
| Grade C, 80-90, 375 e.p., rec. 78% | .04⅛ | | .04¼ | | .04¼ | |

Note: All natural gasoline, except California, is noncorrosive.

## BURNING OIL

| | Feb. 28 | | Feb. 21 | | Feb. 14 | |
|---|---|---|---|---|---|---|
| **KANSAS—** | | | | | | |
| 41-43 water white Kerosene | .04⅜ | .04½ | .04⅜ | .04½ | .04⅜ | .04½ |
| **OKLAHOMA (Group 3)—** | | | | | | |
| 41-43 water white Kerosene | .04⅛ | .04¼ | .04⅛ | .04¼ | .04⅛ | .04¼ |
| 42-44 water white Kerosene | .04⅝ | | .04⅝ | | .04⅝ | .04¾ |
| **NORTH LOUISIANA—** | | | | | | |
| 41-43 prime white Kerosene | .04¾ | .05 | .04¾ | .05 | .04¾ | .05 |
| **NORTH TEXAS—** | | | | | | |
| 41-43 water white Kerosene | .04¼ | | .04¼ | | .04⅛ | .04¼ |
| 40-42 water white Kerosene | .04 | .04⅛ | .04 | .04⅛ | .04 | |
| **ARKANSAS—** | | | | | | |
| 41-43 water white Kerosene | .04¾ | .05 | .04¾ | .05 | .04¾ | .05 |
| **PENNSYLVANIA—** | | | | | | |
| 43 Kerosene prime white | .05¾ | .06 | .06 | .06⅛ | .06 | .06⅛ |
| 45 Kerosene water white | .06 | .06¼ | .06¼ | .06⅜ | .06¼ | .06⅜ |
| 46 Kerosene water white | .06¼ | .06½ | .06½ | .06½ | .06¼ | .06½ |
| 47 Kerosene water white | .06½ | .06¾ | .06½ | .06¾ | .06½ | .06¾ |
| 300 Mineral Seal | .07 | .07¼ | .07 | .07¼ | .07 | .07¼ |
| **CALIFORNIA—** | | | | | | |
| 38-40 water white Kero. (high-burning test) | .05½ | .06 | .05½ | .06 | .05½ | |
| Engine distillate, 43-45, 445 endpoint | .06½ | .07 | .06½ | .07 | .06½ | .07 |
| Engine distillate, 42-44, 480 endpoint | .06¼ | .06¾ | .06¼ | .06¾ | .06¼ | .06¾ |
| **CHICAGO DISTRICT (Based on Group 3)—** | | | | | | |
| 41-43 water white Kerosene | .04¼ | | .04⅛ | .04¼ | .04¼ | .04⅜ |
| 42-44 water white Kerosene | .04⅝ | .04¾ | .04⅝ | .04¾ | .04¾ | |

## FUEL OILS

| | Feb. 28 | | Feb. 21 | | Feb. 14 | |
|---|---|---|---|---|---|---|
| **KANSAS—** | | | | | | |
| 18-20 Fuel Oil, per bbl. | .87½ | | .82½ | .87½ | .80 | .85 |
| 22-26 Fuel Oil, per bbl. | .90 | | .87½ | .90 | .85 | .87½ |
| 32-36 Gas Oil | .02⅝ | .02¾ | .02⅝ | .02¾ | .02⅝ | |
| 38-40 Distillate | .03⅛ | .03¼ | .03¼ | | .03¼ | |
| **OKLAHOMA (Group 3)—** | | | | | | |
| Below 18 Fuel Oil, per bbl. | .75 | .80 | .75 | .77½ | .75 | |
| 18-22 Fuel Oil, per bbl. | .82½ | .85 | .80 | .82½ | .77½ | .82½ |
| 22-26 Fuel Oil, per bbl. | .85 | | .82½ | .85 | .80 | .82½ |
| 24-26 Fuel Oil, per bbl. | .85 | .87½ | .85 | | .80 | .85 |
| 26-30 Fuel Oil, per bbl. | .87½ | .90 | .87½ | | .85 | .87½ |
| 28-30 Fuel Oil, per bbl. | .92½ | | .90 | .95 | .90 | .95 |
| 32-36 Gas Oil (dark) | .02½ | | .02½ | | .02⅜ | |
| 32-36 Gas Oil (straw distillate) | .02⅝ | | .02⅝ | | .02½ | |
| 36-38 Distillate | .03 | | .03 | | .03 | .03½ |
| 38-40 Straw Distillate | .03 | .03⅛ | .03 | .03⅛ | .03 | .03¼ |
| **NORTH TEXAS—** | | | | | | |
| 24-26 Fuel Oil (sellers' cars), per bbl. | .80 | .85 | .77½ | .80 | .75 | .80 |
| 32-36 Gas Oil (straw) | .02⅝ | | .02⅜ | | .02¼ | .02⅝ |
| 38-40 Straw Distillate | .03 | | .03 | | .03 | |
| **NORTH LOUISIANA—** | | | | | | |
| 18-20 Fuel Oil, per bbl. | .97½ | 1.00 | .97½ | 1.00 | .97½ | 1.00 |
| 32-36 Gas Oil | .03 | .03¼ | .03 | .03¼ | .03 | .03¼ |
| **ARKANSAS—** | | | | | | |
| 33-36 Distillate | .03½ | .03¾ | .03½ | .03¾ | .03½ | .03¾ |
| 32-36 Gas Oil (straw) | .02¾ | | .02¾ | | .02¾ | .03 |
| 16-22 Refinery Fuel Oil, per bbl. | .92½ | .95 | .97½ | 1.00 | .97½ | 1.00 |
| **GULF COAST (South Texas)—** | | | | | | |
| Gas Oil | .04¼ | .04½ | .04¼ | .04½ | .04¼ | .04½ |
| Fuel Oil, per bbl. | 1.25 | | 1.25 | | 1.25 | |
| **PENNSYLVANIA—** | | | | | | |
| 30-34 Fuel Oil | .04¾ | .05 | .04¾ | .05 | .04¾ | .05 |
| 36-40 Fuel Oil | .05 | .05¼ | .05 | .05¼ | .04⅞ | .05 |
| **CALIFORNIA—** | | | | | | |
| 33-36 Distillate | .03½ | .03¾ | .03½ | .03¾ | .03½ | .03¾ |
| 27-32 Distillate | .02½ | .03 | .02½ | .03 | .02½ | .03 |
| *15-20 Fuel Oil, Bunker (at tide water) | .85 | 1.00 | .85 | 1.00 | 1.00 | |
| 15-20 Fuel Oil (cargo lots), per bbl. | .75 | .85 | .75 | .85 | .90 | |
| 27 plus Diesel, per bbl. | 1.15 | 1.19 | 1.15 | 1.19 | 1.15 | 1.19 |
| **CHICAGO DISTRICT (Based on Group 3)—** | | | | | | |
| 24-26 Fuel Oil (sellers' cars) Group 3, bbl. | .85 | .90 | .85 | .90 | .82½ | .87½ |
| 22-26 Fuel Oil (sellers' cars) Group 3, bbl. | .82½ | .87½ | .82½ | .87½ | .80 | .85 |
| 18-22 (Group 3), per bbl. | .82½ | .85 | .82½ | .85 | .80 | .82½ |
| 16-20 Smackover, per bbl. | .92½ | .97½ | .95 | 1.00 | .95 | 1.00 |
| 32-36 Gas Oil (zero) | .02¾ | .03 | .02¾ | .03 | .02¾ | .03 |
| 32-36 Gas Oil (industrial) | .02⅝ | | .02½ | .02⅝ | .02½ | .02⅝ |
| 36-38 Distillate | .03 | .03¼ | .03 | .03¼ | .03 | .03¼ |
| 38-40 Straw Distillate | .03¼ | .03⅜ | .03¼ | .03⅜ | .03¼ | .03⅜ |

*Bunkers.

## LUBRICATING OIL AND WAX

| | Feb. 28 | | Feb. 21 | | Feb.14 | |
|---|---|---|---|---|---|---|
| **OKLAHOMA (Group 3)—** | | | | | | |
| 100 vis., 2 color, 20-25 cold test | .06¼ | .06½ | .06¼ | .06½ | .06¼ | .06½ |
| 100 vis., 3 color, 20-25 cold test | .06 | .06¼ | .06 | .06¼ | .06 | .06¼ |
| 150 vis., 3 color, 20-25 cold test | .08¼ | .08½ | .08¼ | .08½ | .08¼ | .08½ |
| 150 vis., 4 color, 20-25 cold test | .08 | .08¼ | .08 | .08¼ | .08 | .08¼ |
| 180 vis., 3 color, 23-28 cold test | .09⅜ | .10 | .09⅜ | .10 | .09⅜ | .10 |
| 180 vis., 4 color, 23-28 cold test | .09¼ | .09¾ | .09¼ | .09¾ | .09¼ | .09¾ |
| 180 vis., 5 color, 23-28 cold test | .09⅛ | .09½ | .09¼ | .09½ | .09⅛ | .09½ |
| 200 vis., 3 color, 23-28 cold test | .09½ | .10½ | .09½ | .10½ | .09½ | .10½ |
| 200 vis., 4 color, 23-28 cold test | .09⅜ | .10¼ | .09⅜ | .10¼ | .09⅜ | .10¼ |
| 200 vis., 5 color, 23-28 cold test | .09¼ | .10 | .09¼ | .10 | .09¼ | .10 |
| 240 vis., 5 color, 25-30 cold test | .13¾ | .14 | .13¾ | .14 | .13¾ | .14 |
| 240 vis., 4 color, 25-30 cold test | .13¼ | .13½ | .13¼ | .13½ | .13¼ | .13½ |
| 240 vis., 5 color, 25-30 cold test | .12¼ | .12½ | .12¼ | .12½ | .12¼ | .12½ |
| 280 vis., 3 color, 25-30 cold test | .15½ | .16 | .15½ | .16 | .15½ | .16 |
| 280 vis., 4 color, 25-30 cold test | .15 | .15½ | .15 | .15½ | .15 | .15½ |
| 280 vis., 5 color, 25-30 cold test | .14 | .14½ | .14 | .14½ | .14 | .14½ |
| Cylinder Stocks: | | | | | | |
| 600, steam refined, light green | .08 | .09 | .08 | .09 | .08 | .09 |
| 600, steam refined, dark green | .06¼ | .06¾ | .06½ | .07 | .06½ | .07 |
| 190-200 vis. @ 210 Bright Stock | .30 | .32 | .30 | .32 | .30 | .32 |
| 150-160 vis. @ 210 Bright Stock | .23 | .25 | .23 | .25 | .23 | .25 |
| Waxes: | | | | | | |
| 124-126 White Crude Scale Wax | .03 | | .02¾ | .02⅞ | .02¾ | .02⅞ |
| **PENNSYLVANIA—** | | | | | | |
| 34 Neutral | .07½ | .07¾ | .07½ | .07¾ | .07½ | .07⅞ |
| 34 Sundebloom | .07¾ | .08 | .07¾ | .08 | .07¾ | .08 |
| 36 Miners' Neutral | .06½ | .06¾ | .06½ | .06¾ | .06½ | .06⅞ |
| 150, 3 color | .27 | .27½ | .27 | .27½ | .26½ | .27 |
| 180, 3 color | .30 | .30½ | .30 | .30½ | .30 | .30½ |
| 200, 3 color | .33 | .33½ | .33 | .33½ | .32½ | .33 |
| 220, 3 color | .34½ | .35 | .34½ | .35 | .34½ | .35 |
| 600, steam refined | .09¼ | .09½ | .09¼ | .09¼ | .09¼ | .09¼ |
| 635, steam refined | .10¼ | .10½ | .10¼ | .10½ | .10¼ | .10⅝ |
| 650, steam refined | .10¾ | .11¼ | .10¾ | .11¼ | .10¾ | .11⅛ |
| 600, Pennsylvania flash | .15 | .16 | .15 | .16 | .15 | .16 |
| *550, E filtered | .15 | .15½ | .15 | .15½ | .15 | .15½ |
| *600, E filtered | .15½ | .16 | .15½ | .16 | .15½ | .16 |
| 600, E filtered | .15¼ | .15⅝ | .15¼ | .15⅜ | .15 | .15¼ |
| 600, D filtered | .23½ | .24 | .23½ | .24 | .23½ | .24 |
| 550, E filtered | .15½ | .16 | .15½ | .16 | .15½ | .16 |
| 550, D filtered | .21½ | .22 | .21½ | .22 | .21½ | .22 |
| Pennsylvania Bright Stock | .27 | .27½ | .27 | .27½ | .27½ | .28 |
| †122-124 White Crude Scale Wax | .03⅛ | .03¼ | .03⅛ | .03¼ | .03 | .03¼ |
| 124-126 White Crude Scale Wax | .03¼ | .03¼ | .03⅛ | .03¼ | .03 | .03¼ |

*At Warren, Pa. †At New York.

| | | | | | | |
|---|---|---|---|---|---|---|
| **GULF COAST (South Texas)—** | | | | | | |
| No. 2 color, 100 vis., pale oil | .06½ | .07½ | .06½ | .07½ | .06½ | .07½ |
| No. 3 color, 200 vis., pale oil | .09 | .09½ | .09 | .09½ | .09 | .09½ |
| No. 3 color, 300 vis., pale oil | .10½ | .11½ | .10½ | .11½ | .10½ | .11½ |
| No. 3½ color, 500 vis., pale oil | .12 | .13 | .12 | .13 | .12 | .13 |
| No. 4 color, 750 vis., pale oil | .14 | .15 | .14 | .15 | .14 | .15 |
| No. 5 to 6 color, 200 vis, red oil | .07½ | .08 | .07½ | .08 | .07½ | .08 |
| No. 5 to 6 color, 300 vis., red oil | .08½ | .09 | .08½ | .09 | .08½ | .09 |
| No. 5 to 6 color, 500 vis., red oil | .09½ | .10½ | .09½ | .10½ | .09½ | .10½ |
| No. 5 to 6 color, 750 vis., red oil | .12 | .12½ | .12 | .12½ | .12 | .12½ |
| No. 2½ color, 200 vis., pale filtered | .11½ | .12 | .11½ | .12 | .11½ | .12 |
| No. 2½ color, 300 vis., pale filtered | .13 | .13½ | .13 | .13½ | .13 | .13½ |
| No. 2½ color, 500 vis., pale filtered | .14 | .15 | .14 | .15 | .14 | .15 |

# REFINERY AND CRUDE PRICES

**Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields**

| | | | | | | |
|---|---|---|---|---|---|---|
| No. 2½-3 color, 750 vis., pale filtered | .17½ | .19 | .17½ | .19 | .17½ | .19 |
| **CALIFORNIA—** | | | | | | |
| 150 vis., 2½-3 color | .09 | .10 | .09 | .10 | .09 | .10 |
| 200 vis., 2½-3 color | .10 | .10½ | .10 | .10½ | .10 | .10½ |
| 300 vis., 3-3½ color | .10½ | .11 | .10½ | .11 | .10½ | .11 |
| 350 vis., 3½-4 color | .11 | .12 | .11 | .12 | .11 | .12 |
| 400 vis., 3½-4 color | .13 | .14 | .13 | .14 | .13 | .14 |
| Red Neutral: | | | | | | |
| 200 vis., 4½-5 color | .08½ | .09 | .08½ | .09 | .08½ | .09 |
| 300 vis., 5-6 color | .09 | .09½ | .09 | .09½ | .09 | .09½ |
| 400 vis., 5-6 color | .11 | .11½ | .11 | .11½ | .11 | .11½ |
| 500 vis., 4½-5 color | .11½ | .12 | .11½ | .12 | .11½ | .12 |
| 500 vis., 5-6½ color | .11 | .11½ | .11 | .11½ | .11 | .11½ |
| 600 vis., 6 plus color | .12 | .12½ | .12 | .12½ | .12 | .12½ |

Note: Bright Stocks are not manufactured commercially on the Pacific Coast.

## NEW YORK (BAYONNE) REFINERY PRICES

| | Feb. 28 | Feb. 21 | Feb. 14 |
|---|---|---|---|
| Gasoline, U. S. Motor, 58-60 437 | .08¼ | .08¼ | .08¼ |
| Kerosene, water white, 41-43 | .07½ | .07½ | .07½ |
| *Fuel Oil, bunker "C," 14-16, per bbl. | 1.35 | 1.35 | 1.35 |
| *Fuel Oil, Diesel, 28-30, per bbl. | 2.00 | 2.00 | 2.10 |
| Gas Oil, 28 plus | .05¼ | .05¼ | .05½ |
| 25 pale Paraffin Oil | .12 | .12 | .12 |
| 28 pale Paraffin Oil | .07 | .07 | .07 |
| 285 red Paraffin Oil | .11½ | .11½ | .11½ |
| 250 red Paraffin Oil | .10½ | .10½ | .10½ |
| 225 red Paraffin Oil | .09½ | .09½ | .09½ |
| 200 red Paraffin Oil | .09 | .09 | .09 |
| Refined Wax: | | | |
| 120-122 a.m.p., per lb. | .04 | .04 | .04 |
| 125-127 a.m.p., per lb. | .04¼ | .04¼ | .04¼ |
| 130-132 a.m.p., per lb. | .04¾ | .04¾ | .04¾ |
| 135-137 a.m.p., per lb. | .05½ | .05½ | .05½ |
| Petrolatum, in bbls., carload lots, per lb: | | | |
| Dark green | .02 | .02 | .02 |
| Amber | .03⅜ | .03⅜ | .03⅜ |
| Extra amber | .03¾ | .03¾ | .03¾ |
| Cream | .06½ | .06½ | .06½ |
| Lily White | .08¾ | .08¾ | .08¾ |
| Snow White | .09¾ | .09⅜ | .09⅜ |

*Lighterage, 6.5c a barrel extra.

## NEW YORK (BAYONNE) EXPORT PRICES

| | Feb. 28 | Feb. 21 | Feb. 14 |
|---|---|---|---|
| Gasoline, U. S. Motor, 58-60 437, in cases | .2365 | .2365 | .2365 |
| Kerosene, standard white, in cases | .1690 | .1690 | .1690 |
| Kerosene, water white, in cases | .1790 | .1790 | .1790 |
| 600, steam refined cylinder stock, in bbls. | .17 | .17 | .17 |
| 635, steam refined | .19 | .19 | .19 |
| 650, steam refined | .20 | .20 | .20 |
| 600, Pennsylvania flash | .23 | .23 | .23 |
| 630, Pennsylvania flash | .35 | .35 | .35 |
| 600, Warren E | .25 | .25 | .25 |
| 600, Oil City E | .24 | .24 | .24 |
| Light 135 Bright Stock | .40 | .40 | .40 |
| Dark 135 Bright Stock | .38 | .38 | .38 |

## LOS ANGELES EXPORT PRICES

| | Feb. 28 | | Feb. 21 | | Feb. 14 | |
|---|---|---|---|---|---|---|
| Kerosene, water white | .04¾ | .05 | .04¾ | .05 | .04½ | .05 |
| U. S. Motor Gasoline, 53-55 437 e.p. | .06¼ | .06½ | .06⅛ | .06¼ | .06 | .06⅛ |

## CRUDE OIL PRICES

**OKLAHOMA, KANSAS, NORTH AND EAST CENTRAL TEXAS**

*Corsicana heavy (March 14, 1927) ....$1.00
Other fields ..... See gravity table

*Posted by Magnolia Petroleum Co.

**TEXAS PANHANDLE**
**Carson and Hutchinson**

| | |
|---|---|
| Below 31 gravity | $ .60 |
| 31-31.9 | .65 |
| 32-32.9 | .70 |
| 33-33.9 | .73 |
| 34-34.9 | .76 |
| 35-35.9 | .79 |
| 36-36.9 | .82 |
| 37-37.9 | .85 |
| 38-38.9 | .88 |
| 39-39.9 | .91 |
| 40-40.9 | .94 |
| 41-41.9 | .97 |
| 42-42.9 | 1.00 |
| 43-43.9 | 1.03 |
| 44 and above | 1.06 |

**Wheeler County**

| | |
|---|---|
| Below 29 gravity | $ .60 |
| 29-29.9 | .65 |
| 30-30.9 | .70 |
| 31-31.9 | .75 |
| 32-32.9 | .80 |
| 33-33.9 | .83 |
| 34-34.9 | .86 |
| 35-35.9 | .89 |
| 36-36.9 | .92 |
| 37-37.9 | .95 |
| 38-38.9 | .98 |
| 39-39.9 | 1.01 |
| 40-40.9 | 1.04 |
| 41-41.9 | 1.07 |
| 42-42.9 | 1.10 |
| 43-43.9 | 1.13 |
| 44 and above | 1.16 |
| Gray County | See gravity table |

Humble Oil & Refining Co. Magnolia Petroleum Co. February 21.

| | |
|---|---|
| †Iatan | Same as North Texas |
| Crane-Upton-Crockett | See gravity table |
| †Glasscock | .60 |
| †Chalk | .80 |

*Includes Howard County and Westbrook Fields. Kay County Gas Co. pays $1.05 for Howard County crude, effective May 21.
†Magnolia Petroleum Co., Jan. 14, 1928.

**ARKANSAS-NORTH LOUISIANA**

| | |
|---|---|
| Cotton Valley (Feb. 7, 1298) | $ .75 |
| Bellevue (Feb. 24, 1927) | 1.20 |
| Urania (Nov. 18, 1927) | .75 |
| East El Dorado (March 16, 1927) | 1.00 |
| Other fields | See gravity table |

Note—Cotton Valley and Bellevue, Standard Oil Co. of Louisiana, Louisiana Oil Refining Co., Gulf Refining Co. and Magnolia Petroleum Co.; (Magnolia Petroleum Co. posted Cotton Valley February 8); Urania, Louisiana Oil Refining Corp.; East El Dorado, Magnolia Petroleum Co., Gulf Refining Co.

**GULF COAST**
(Goose Creek, Hull, Liberty, West Columbia, Orange, Boling, Sour Lake, Humble, High Island, Pierce Junction and Spindletop.)

| | |
|---|---|
| †Grade A (March 14) | $1.20 |
| Grade B | See gravity table |
| *Jennings, La. (March 14) | $1.05 |
| †Saratoga, Batson, Dayton (March 14, 1927) | $1.20 |
| §Markham (March 14) | 1.00 |

*Gulf Pipe Line Co. †Sun Pipe Line Co ‡Humble Oil & Refining Co. and other major buyers. §The Texas Company.

**SOUTH CENTRAL AND SOUTHWESTERN TEXAS**

| | |
|---|---|
| *Luling (May 5) | $1.00 |
| †Mirando (March 14) | 1.00 |
| Rockdale-Minerva (April 15): | |
| Below 38 gravity | 1.25 |
| 38-38.9 gravity | 1.27 |
| 39-39.9 gravity | 1.29 |
| 40 and above | 1.31 |
| *Thrall | 1.75 |
| Callihan (May 15) | 1.75 |

(Continued on Page 214)

## CRUDE OIL GRAVITY TABLE

| Gravity— | Okla., Kans., N. C. Tex. 1 | No. La. and Ark 2 | Smackover, Ark. 3 | Stephens, Ark. 4 | Gray County (Texas Panhandle) | Crane, Upton, Pecos, Crockett Counties (West Texas) | Salt Creek, Wyo. 7 | Grade B Crude (G. Coast) | Somerset (South Central Texas) 9 |
|---|---|---|---|---|---|---|---|---|---|
| 24 and above | .... | .... | .90 | .... | .... | .... | .... | .... | .... |
| Below 24 | .76 | .... | .75 | .... | .... | .... | .... | .... | .... |
| Below 25 | .... | .... | .... | .... | .... | .... | .... | 1.15 | .... |
| 24 to 24.9 | .76 | .... | .... | .... | .... | .... | .... | .... | .... |
| 25 to 25.9 | .81 | .... | .... | .... | .... | .... | .... | .... | .... |
| Below 26 | .... | .... | .... | .... | .60 | .60 | .... | .... | .... |
| 26 to 26.9 | .86 | .... | .... | .... | .60 | .60 | .... | 1.19 | .... |
| 27 to 27.9 | .91 | .... | .... | .... | .65 | .60 | .... | 1.21 | .... |
| Below 28 | .... | .91 | .... | .75 | .... | .... | .... | .... | .... |
| 28 to 28.9 | .96 | .96 | .... | .87 | .70 | .60 | .... | 1.23 | .... |
| 29 to 29.9 | 1.01 | 1.01 | .... | .89 | .75 | .60 | 1.01 | 1.25 | .... |
| 30 to 30.9 | 1.06 | 1.06 | .... | .91 | .80 | .60 | 1.06 | 1.27 | .... |
| 31 to 31.9 | 1.11 | 1.11 | .... | .93 | .85 | .60 | 1.11 | 1.29 | .... |
| 32 to 32.9 | 1.16 | 1.16 | .... | .95 | .90 | .60 | 1.16 | 1.31 | 1.05 |
| 33 to 33.9 | 1.19 | 1.19 | .... | .... | .93 | .60 | 1.18 | 1.33 | 1.07 |
| 34 to 34.9 | 1.22 | 1.22 | .... | .... | .96 | .60 | 1.22 | 1.35 | 1.09 |
| 35 to 35.9 | 1.25 | 1.25 | .... | .... | .99 | .60 | 1.25 | 1.37 | 1.11 |
| 36 to 36.9 | 1.28 | 1.28 | .... | .... | 1.02 | .60 | 1.28 | .... | 1.13 |
| 37 to 37.9 | 1.31 | 1.31 | .... | .... | 1.05 | .... | 1.31 | .... | 1.15 |
| 38 to 38.9 | 1.34 | 1.34 | .... | .... | 1.08 | .... | .... | .... | 1.17 |
| 39 to 39.9 | 1.37 | 1.37 | .... | .... | 1.11 | .... | .... | .... | .... |
| 40 to 40.9 | 1.40 | 1.40 | .... | .... | 1.14 | .... | .... | .... | .... |
| 41 to 41.9 | 1.43 | 1.43 | .... | .... | 1.17 | .... | .... | .... | .... |
| 42 to 42.9 | 1.46 | 1.46 | .... | .... | 1.20 | .... | .... | .... | .... |
| 43 to 43.9 | 1.49 | 1.49 | .... | .... | 1.23 | .... | .... | .... | .... |
| 44 to 44.9 | 1.52 | 1.52 | .... | .... | 1.26 | .... | .... | .... | .... |
| 45 to 45.9 | 1.55 | 1.55 | .... | .... | .... | .... | .... | .... | .... |
| 46 to 46.9 | 1.58 | 1.58 | .... | .... | .... | .... | .... | .... | .... |
| 47 to 47.9 | 1.61 | 1.61 | .... | .... | .... | .... | .... | .... | .... |
| 48 to 48.9 | 1.64 | 1.64 | .... | .... | .... | .... | .... | .... | .... |
| 49 to 49.9 | 1.67 | 1.67 | .... | .... | .... | .... | .... | .... | .... |
| 50 to 50.9 | 1.70 | 1.70 | .... | .... | .... | .... | .... | .... | .... |
| 51 to 51.9 | 1.73 | 1.73 | .... | .... | .... | .... | .... | .... | .... |
| 52 and above | 1.76 | 1.76 | .... | .... | .... | .... | .... | .... | .... |

Column 1—Magnolia Petroleum Co. posted schedule February 24, 1928, making price below 30 gravity $.75 per barrel, 30-30.9 gravity $.90 and 31-31.9 gravity $1.05, with 3 cents increase per degree higher in gravity, taking 32-32.9 gravity at $1.16 as basis, with a top price of $1.76 for 52 and above.

Humble Oil Refining Co. posted $1.52 on all oil 44 gravity and above.

Oklahoma—Prairie Oil & Gas Co., Sinclair Oil & Gas Co., Gypsy Oil Co., Carter Oil Co., The Texas Company, February 21.

North Central Texas—[Including Ranger, Mexia, Powell, Richland, Wortham, Lytton Springs (Southwest Texas), Iatan and Panola (Magnolia only. Iatan posted on flat price of $.93 by Magnolia on January 14, 1928). Currie, Nocona, Moran and Corsicana light]; Texas, Prairie, Sinclair and Gulf; The Texas Company, Humble Oil & Refining Co., February 21.

Kansas—Prairie, Sinclair; Carter, The Texas Company, February 21.

Column 2—Arkansas and North Louisiana—[Caddo, Bull Bayou, Crichton, De Soto, Haynesville, Homer and El Dorado only]; Standard Oil Co. of Louisiana, Texas Pipe Line Co., Louisiana Oil Refining Co., February 21 and Magnolia Petroleum Co. February 23.

Column 3—February 6, Louisiana Oil Refining Co. February 7, Standard Oil Co. of Louisiana, The Texas Company, Gulf Refining Co., Magnolia Petroleum Co. February 8, and Atlantic Production Co. February 10.

Column 4—Atlantic Oil Producing Co., Louisiana Oil Refining Corp, The Texas Company, February 22.

Column 5—Humble Oil & Refining Co., Magnolia Petroleum Co., February 21.

Column 6—Humble Oil & Refining Co., August 23; Kay County Gas Co., Magnolia Petroleum Co., and Gulf Pipe Line Co., August 24.

Column 7—Midwest Refining Co., February 21. All crude over 37 gravity, $1.31 per barrel. Column 8—Humble Oil & Refining Co. and other major buyers (schedule ends "35 and above"), March 14, with exception of Magnolia Petroleum Co., which stops at 31 degrees gravity. Sun Pipe Line Co. posted 2 cents differential for each degree above 35 gravity and $1.47 for 40 gravity and above.

Column 9—Grayburg Pipe Line Co. and Pioneer Oil & Refining Co., April 7.

### CALIFORNIA CRUDE OIL PRICES
**Standard Oil Co.-Union Oil Co. (Effective April 1, 1927)***

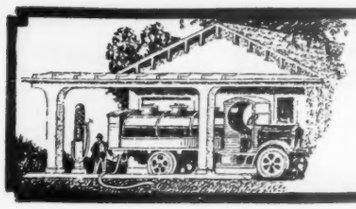
| Gravity— | Fullerton Seal Beach Huntington Beach Richfield *Rosecrans-Dominguez Torrance-Inglewood | Whittier La Habra *Montebello | Kern River Newhall-McKittrick Midway-Sunset §Elk Hills Lost Hills Beiridge Buena Vista Hills *Coyote | *Santa Fe Springs | §Coalinga | Wheeler Ridge | Santa Maria Ventura, Orcutt Salt Lake |
|---|---|---|---|---|---|---|---|
| 14° | .85 | .85 | .75 .85 | .... | .75 | .75 | .85 |
| 15° | .85 | .85 | .75 .85 | .... | .75 | .75 | .85 |
| 16° | .85 | .85 | .75 .85 | .... | .75 | .75 | .85 |
| 17° | .85 | .85 | .75 .85 | .... | .75 | .75 | .85 |
| 18° | .85 | .85 | .75 .85 | .... | .75 | .75 | .85 |
| 19° | .85 | .85 | .75 .85 | .... | .75 | .75 | .85 |
| 20° | .85 | .85 | .77 .85 | .... | .76 | .76 | .85 |
| 21° | .86 | .85 | .79 .86 | .85 | .77 | .77 | .85 |
| 22° | .87 | .85 | .81 .87 | .85 | .78 | .78 | .85 |
| 23° | .88 | .85 | .83 .88 | .85 | .79 | .79 | .85 |
| 24° | .89 | .85 | .85 .89 | .85 | .80 | .80 | .85 |
| 25° | .90 | .86 | .87 .90 | .86 | .81 | .81 | .86 |
| 26° | .92 | .87 | .89 .91 | .87 | .83 | .82 | .87 |
| 27° | .94 | .88 | .91 .92 | .88 | .85 | .83 | .88 |
| 28° | .96 | .89 | .93 .93 | .89 | .87 | .... | .89 |
| 29° | .98 | .90 | .96 .94 | .91 | .89 | .... | .91 |
| 30° | 1.00 | .91 | .99 .95 | .93 | .91 | .... | .93 |
| 31° | 1.03 | .... | 1.02 .... | .95 | .93 | .... | .95 |
| 32° | 1.06 | .... | 1.05 .... | .97 | .95 | .... | .97 |
| 33° | 1.09 | .... | 1.08 .... | .99 | .97 | .... | .99 |
| 34° | 1.12 | .... | 1.11 .... | 1.01 | .99 | .... | 1.01 |
| 35° | 1.15 | .... | .... .... | 1.03 | 1.01 | .... | 1.03 |
| 36° | 1.18 | .... | .... .... | 1.06 | .... | .... | 1.06 |
| 37° | 1.21 | .... | .... .... | 1.09 | .... | .... | 1.09 |
| 38° | 1.24 | .... | .... .... | 1.12 | .... | .... | 1.12 |
| 39° | 1.27 | .... | .... .... | 1.15 | .... | .... | 1.15 |
| 40° | 1.30 | .... | .... .... | .... | .... | .... | .... |
| 41° | 1.33 | .... | .... .... | .... | .... | .... | .... |
| 42° | 1.36 | .... | .... .... | .... | .... | .... | .... |

*Column 1—Long Beach, Seal Beach and Huntington Beach crudes, 14 to 32 degrees, inclusive; Richfield and Fullerton, 14 to 30 degrees; Torrance and Inglewood, 14 to 28 degrees; Dominguez, 24 to 42 degrees. Rosecrans crude ranges from 14 to 42 degrees, but only Union Oil Co. posts below 24 degrees.

Column 2—Whittier crude, 14 to 22 degrees; Montebello, 14 to 30 degrees.

Column 3—Kern River, Newhall and McKittrick, 14 to 19 degrees; Midway-Sunset, Buena Vista and Elk Hills, 14 to 33 degrees; Lost Hills and Beiridge, 14 to 34 degrees.

Column 4—Salt Lake, 14 to 19 degrees, inclusive; Santa Maria, 14 to 30 degrees; Ventura and Orcutt, 14 to 39 degrees. Posted by Union Oil Co.



# TANK WAGON MARKETS

Tank wagon quotations for gasoline and kerosene in United States as furnished by the larger marketing concerns Feb. 28.

## ALL TANK WAGON AND SERVICE STATION QUOTATIONS INCLUDE TAXES

### STANDARD OIL CO. (INDIANA)

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| Chicago dist. | 14 0 | 16 0 | ... | 12 0 |
| Decatur, Ill. | 13.5 | 15.5 | ... | 12.1 |
| E. St. Louis | 13.1 | 15.35 | ... | 11.2 |
| Joliet | 14.4 | 16.4 | ... | 12.3 |
| Peoria | 14.2 | 16.2 | ... | 12.1 |
| Quincy | 14.2 | 16.2 | ... | 11.9 |
| Davenport, Ia. | 15.5 | 17.5 | 3.0 | 12.3 |
| Des Moines | 15.9 | 17.9 | 3.0 | 12.3 |
| Keokuk | 17.5 | 19.5 | 3.0 | 12.3 |
| Sioux City | 17.1 | 19.1 | 3.0 | 11.9 |
| Duluth, Minn. | 15.5 | 17.5 | 2.0 | 12.9 |
| Minneapolis | 15.0 | 16.0 | 2.0 | 12.9 |
| Mankato | 14.1 | 16.1 | 2.0 | 12.7 |
| La Crosse, Wis. | 17.2 | 19.2 | 2.0 | 13.0 |
| Milwaukee | 16.1 | 18.1 | 2.0 | 11.9 |
| Madison | 16.3 | 18.3 | 2.0 | 12.1 |
| Detroit, Mich. | 17.8 | 19.8 | 3.0 | 13.7 |
| Grand Rapids | 17.7 | 19.7 | 3.0 | 13.6 |
| Saginaw | 17.9 | 19.9 | 3.0 | 13.8 |
| Evansville, Ind. | 17.0 | 19.0 | 3.0 | 13.0 |
| Ft. Wayne | 16.4 | 17.4 | 3.0 | 13.4 |
| Indianapolis | 15.2 | 16.2 | 3.0 | 12.2 |
| South Bend | 17.4 | 17.4 | 3.0 | 13.4 |
| Fargo, N. D. | 18.9 | 20.9 | 2.0 | 14.9 |
| Huron, S. D. | 19.5 | 21.5 | 4.0 | 13.9 |
| Sioux Falls | 16.0 | 18.0 | 4.0 | 13.4 |
| *K. C., Mo. | 14.9 | 16.9 | 3.0 | 10.6 |
| *Springfield | 16.8 | 18.8 | 3.0 | 11.5 |
| *St. Louis | 15.6 | 17.9 | 2.5 | 11.3 |
| *St. Joseph | 14.5 | 16.5 | 3.0 | 11.2 |
| Wichita, Kans. | 14.8 | 16.8 | 2.0 | 10.8 |
| Bartlesville, Ok. | 15.5 | 17.5 | 3.0 | 10.5 |

### NAPHTHAS

| | Tank wagon | Tank car |
|---|---|---|
| Oleum spirits | 14.7 | 9.5 |
| V. M. & P. naphtha | 16.2 | 11.0 |
| Cleaner's naphtha | 13.0 | 12.0 |
| Stanisol | 19.0 | 12.5 |

Tank wagon prices f.o.b. Chicago; tank car prices f.o.b. Whiting.

### STANOLIND FURNACE OIL IN CHICAGO

| | |
|---|---|
| Less than 100 gallons | 9.0 |
| 100 to 799 gallons | 8.0 |
| 800 or more gallons | 7.5 |

Note—Outside Chicago furnace oil discount of 1 cent per gallon is given on deliveries of 100 to 349 gallons and 1½ cents on deliveries of 350 gallons or more.

Tank wagon prices of gasoline subject to discount of 1 cent a gallon on dumps of 50 gallons or more throughout territory except Chicago district where discount applies only to dumps of 100 gallons. Kerosene subject to 1 cent discount on dumps of 50 gallons or more.

Outside the Chicago district, the following quantity discount schedule is in effect on monthly tank wagon deliveries of gasoline: 6,000 gallons or more, 1½ cents; 10,000 gallons or more, 2 cents; 15,000 gallons or more, 3 cents. These discounts include the 1 cent allowed on dumps of 50 gallons or more at one delivery.

Within the Chicago district, the following quantity discount schedule is in effect on tank wagon deliveries of gasoline: 750 to 2,000 gallons, one-half cent; 2,000 to 3,000 gallons, three-fourths cent; 3,000 to 6,000 gallons, 1 cent; 6,000 to 10,000 gallons, 1¼ cents; 10,000 to 15,000 gallons, 2 cents; 15,000 gallons or more, 3 cents. These discounts are in addition to the special discount of 1 cent on dumps of 100 gallons or more at one delivery.

If the quantity bought during the year is equal to or exceeds 12 times the agreed monthly quantity, the discount is paid or credited on the entire quantity at the close of the term less the monthly payments made during the year.

*State tax 2 cents; remainder city tax.

### OHIO

**Standard Oil Co. (Ohio)**

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| All Ohio points | 17.0 | 19.0 | 3.0 | 14.5 |

### SOUTHWESTERN DISTRICT

**Magnolia Petroleum Co.***

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| Dallas, Tex. | 12 0 | 15.0 | 3 0 | 11.0 |
| Fort Worth | 14.0 | 16.0 | 3.0 | 10.0 |
| Houston | 13.0 | 15.0 | 3.0 | 15.0 |
| San Antonio | 13.0 | 15.0 | 3.0 | 10.0 |
| El Paso | 14.0 | 15.0 | 3.0 | 16.0 |
| Texarkana | 15.0 | 13.0 | 3.0 | 12.0 |
| Muskogee, Ok. | 14.0 | 17.0 | 3.0 | 11.0 |
| Okla. City | 14.0 | 15.0 | 3.0 | 11.0 |
| Tulsa | 15.0 | 16.0 | 3.0 | 11.0 |
| Ft. Smith, Ark. | 14.0 | 17.0 | 5.0 | 10.0 |
| Little Rock | 16.0 | 16.0 | 5.0 | 11.0 |

*The following is the schedule of discounts on quantity gasoline sales adopted by the Magnolia Petroleum Co. in Oklahoma: Over 750 gallons a month, one-half cent; over 2,000 gallons, three-quarters cent; over 3,000 gallons, 1 cent; over 4,500 gallons, 1¼ cents; over 6,000 gallons, 1½ cents; over 8,000 gallons, 1¾ cents; over 10,000 gallons, 2 cents. If the quantity bought during the year is 12 times the monthly agreed purchases, the discount will be paid or credited on the entire quantity for the year less any monthly purchases.

The schedule on service station deliveries is: Over 200 gallons a month, 1 cent; over 300 gallons a month, 1¼ cents; over 400 gallons, 1½ cents; over 500 gallons a month, 1¾ cents; over 600 gallons, 2 cents. The same rule applies for annual purchases in the tank wagon discounts.

### CENTRAL SOUTH DISTRICT

**Standard Oil Co. (Louisiana)**

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| *N. Orleans, La. | 15.5 | 18.5 | 3.0 | 14.0 |
| Baton Rouge | 14.0 | 17.0 | 2.0 | 12.5 |
| Alexandria | 15.0 | 18.0 | 2.0 | 14.0 |
| La Fayette | 15.0 | 18.0 | 2.0 | 13.5 |
| Lake Charles | 15.5 | 18.5 | 2.0 | 14.0 |
| Shreveport | 15.5 | 18.5 | 2.0 | 13.0 |
| Kn'xville, Tenn. | 19.5 | 22.5 | 3.0 | 15.0 |
| Memphis | 17.0 | 18.5 | 3.0 | 14.0 |
| Chattanooga | 19.5 | 22.5 | 3.0 | 15.0 |
| Nashville | 18.0 | 21.0 | 3.0 | 15.0 |
| Bristol | 19.0 | 22.0 | 3.0 | 14.0 |
| Lit. Rock, Ark. | 16.0 | 16.0 | 5.0 | 11.0 |

*Tax of 3 cents includes city tax of 1 cent.
*Louisiana kerosene prices include 1-cent state tax and 1-cent parish tax.

### SOUTHERN DISTRICT

**Standard Oil Co. (Kentucky)**

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| Atlanta, Ga. | 17.0 | 19.0 | 4.0 | 14.0 |
| Augusta | 18.0 | 22.0 | 4.0 | 16.5 |
| Macon | 16.0 | 19.0 | 4.0 | 13.5 |
| Savannah | 17.0 | 19.0 | 4.0 | 14.5 |
| Birm'h'm, Ala. | 18.0 | 21.0 | 4.0 | 14.5 |
| Mobile | 17.0 | 20.0 | 4.0 | 14.0 |
| Montgomery | 16.0 | 19.0 | 5.0 | 15.5 |
| Clarks'le, Miss. | 17.0 | 20.0 | 4.0 | 11.5 |
| Jackson | 17.0 | 20.0 | 4.0 | 11.5 |
| Natchez | 16.5 | 19.5 | 4.0 | 14.0 |
| Gulfport | 18.5 | 21.5 | 6.0 | 14.0 |
| Vicksburg | 16.5 | 19.5 | 4.0 | 14.0 |
| Jack'ville, Fla. | 18.0 | 21.0 | 5.0 | 11.5 |
| Miami | 20.0 | 23.0 | 5.0 | 14.5 |
| Pensacola | 19.0 | 22.0 | 5.0 | 13.0 |
| Tampa | 18.0 | 21.0 | 5.0 | 13.0 |
| Lexington, Ky. | 18.0 | 21.0 | 5.0 | 15.5 |
| Covington | 19.0 | 22.0 | 5.0 | 15.5 |
| Louisville | 18.0 | 21.0 | 5.0 | 15.0 |

In addition to the state tax of 4 cents on gasoline, Montgomery has city tax of 1 cent on gasoline. Kerosene prices in Georgia includes 1 cent tax. In Florida, an inspection fee of 0.125 cent; in Alabama, an inspection fee of one-half cent on kerosene only. Pensacola tax includes 1 cent city levy. Gulfport tax includes privilege tax of 2 cents in addition to state tax.

### PENNSYLVANIA-DELAWARE AND PART NEW ENGLAND

**Atlantic Refining Co.**

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| Pittsburgh, Pa. | 16.0 | *22.0 | ... | 14.0 |
| Philadelphia | 15.0 | *21.0 | ... | 14.0 |
| Scranton | 16.0 | *22.0 | ... | 14.0 |
| Allentown | 16.0 | *22.0 | ... | 14.0 |
| Altoona | 16.0 | *22.0 | ... | 14.0 |
| Erie | 12.0 | *18.0 | ... | 14.0 |
| Dover, Del. | 19.0 | 22.0 | 3.0 | 14.0 |
| Wilmington | 19.0 | 22.0 | 3.0 | 14.0 |
| Spring'd, Mass. | 16.0 | 16.0 | ... | 15.0 |
| Worcester | 15.0 | 15.0 | ... | 15.0 |
| Boston | 15.0 | 15.0 | ... | 15.0 |
| Providence, R.I. | 19.0 | 19.0 | 2.0 | 15.0 |
| Hartford, Conn. | 18.0 | 18.0 | 2.0 | 15.0 |
| New Haven | 18.0 | 18.0 | 2.0 | 15.0 |

*Includes tax of 3.0 cents. Pennsylvania tax is collected by the dealer and paid by him direct to the State.

### NEW YORK AND PART OF NEW ENGLAND DISTRICT

**Standard Oil Co. (New York)**

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| Albany, N. Y. | 17.0 | 19.0 | ... | 15.0 |
| *New York | 17.0 | 19.0 | ... | 15.0 |
| Buffalo | 17.0 | 19.0 | ... | 14.0 |
| Rochester | 13.0 | 16.0 | ... | 14.0 |
| Syracuse | 17.0 | 19.0 | ... | 15.0 |
| Boston, Mass. | 17.0 | 19.0 | ... | 15.0 |
| Augusta, Me. | 21.0 | 23.0 | 4.0 | 15.0 |
| M'nch't'r, N. H. | 19.0 | 23.0 | 4.0 | 15.0 |
| Burlington, Vt. | 20.0 | 22.0 | 3.0 | 15.0 |

*Price in steel barrels.

### NEBRASKA

**Standard Oil Co. (Nebraska)**

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| Omaha | 15.25 | 17.25 | 2.0 | 13.25 |
| McCook | 14.75 | 14.75 | 2.0 | 11.50 |
| Norfolk | 16.75 | 18.75 | 2.0 | 12.75 |
| N. Platte | 17.75 | 19.75 | 2.0 | 13.50 |
| Scottsbluff | 17.25 | 19.25 | 2.0 | 13.00 |

### PACIFIC COAST DISTRICT

**Standard Oil Co. (California)**

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| San Francisco | 17.0 | 21.0 | 3.0 | 15.5 |
| Pueblo | 18.0 | 18.0 | 3.0 | 15.5 |
| Los Angeles | 16.5 | 20.5 | 3.0 | 16.5 |
| Reno, Nev. | 22.0 | 26.0 | 4.0 | 19.0 |
| Portland, Ore. | 17.5 | 21.5 | 3.0 | 16.5 |
| Seattle, Wash. | 16.5 | 20.5 | 2.0 | 16.5 |
| Tacoma | 16.5 | 20.5 | 2.0 | 16.5 |
| Spokane | 20.5 | 24.5 | 2.0 | 20.5 |
| Phoenix, Ariz. | 23.0 | 27.0 | 4.0 | 20.5 |

### ATLANTIC COAST DISTRICT

**Standard Oil Co. (New Jersey)**

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| Atlantic City | 18.0 | 20.0 | 2.0 | 14.0 |
| Newark, N. J. | 18.0 | 20.0 | 2.0 | 14.0 |
| Annapolis, Md. | 20.0 | 23.0 | 4.0 | 12.0 |
| Baltimore | 20.0 | 23.0 | 4.0 | 10.0 |
| Cumberland | 20.0 | 23.0 | 4.0 | 14.0 |
| Washington | 18.0 | 21.0 | 2.0 | 12.0 |
| Danville, Va. | 20.5 | ... | 4.5 | 14.0 |
| Norfolk | 20.5 | 23.5 | 4.5 | 12.0 |
| Petersburg | 20.5 | 23.5 | 4.5 | 14.0 |
| Roanoke | 20.5 | 23.5 | 4.5 | 14.0 |
| Richmond | 18.5 | 21.5 | 4.5 | 14.0 |
| Ch'rslt'n, W.Va. | 20.0 | 23.0 | 4.0 | 14.0 |
| Keyser | 20.0 | 23.0 | 4.0 | 14.0 |
| Parkersburg | 17.0 | 20.0 | 4.0 | 14.0 |
| Wheeling | 20.0 | 23.0 | 4.0 | 14.0 |
| Charlotte, N. C. | 20.0 | 23.0 | 4.0 | 14.0 |
| Hickory | 20.0 | 20.0 | 4.0 | 14.0 |
| Mt. Airy | 20.0 | 23.0 | 4.0 | 14.0 |
| Salisbury | 20.0 | 23.0 | 4.0 | 14.0 |
| Charlst'n, S. C. | 20.0 | 23.0 | 5.0 | 14.0 |
| Columbia | 20.0 | 23.0 | 5.0 | 14.0 |

### ROCKY MOUNTAIN DISTRICT

**Continental Oil Co.**

| | Gasoline | | | Kero. |
|---|---|---|---|---|
| | Tank wagon | Service station | Incl'd's tax | tank of wagon |
| Denver, Colo. | 16.0 | 18.0 | 3.0 | 12.5 |
| Pueblo | 16.0 | 18.0 | 3.0 | 14.5 |
| Grand Jnctn. | 20.5 | 22.5 | 3.0 | 18.0 |
| Casper, Wyo. | 17.0 | 19.0 | 3.0 | 13.0 |
| Cheyenne | 18.0 | 20.0 | 3.0 | 14.5 |
| Butte, Mont. | 22.5 | 22.5 | 3.0 | 19.0 |
| Helena | 22.5 | 24.5 | 3.0 | 19.0 |
| Salt L'ke, Utah | 20.0 | 21.0 | 3.5 | 17.0 |
| Albu'que, N. M. | 21.0 | 24.0 | 5.0 | 17.0 |
| Boise, Idaho | 23.5 | 25.5 | 4.0 | 19.0 |
| Twin Falls | 23.5 | 25.5 | 4.0 | 19.0 |

## TANK WAGON CHANGES

February 23—Standard Oil Co. of Indiana increased the gasoline tank wagon and station prices 3.9 cents in Fargo, N. Dak., to 18.9 and 20.9 cents.

February 25—Standard Oil Co. of Indiana reduced the gasoline tank wagon and station prices 2 cents throughout Illinois following the decision of the Illinois supreme court in which the 2-cent gasoline tax was declared illegal.

February 25—Magnolia Petroleum Co. increased the gasoline tank wagon and station prices 1 cent throughout Oklahoma except in Tulsa, where the prices were advanced 2 cents. Kerosene was advanced 1 cent at all Oklahoma points.

February 27—Standard of Indiana increased the gasoline tank wagon and station prices 2 cents in Detroit, Mich., to 17.8 and 19.8 cents

## CRUDE CHANGES

February 23—Ohio Oil Co. reduced Plymouth, Illinois, and Princeton crudes 10 cents per barrel.

## OIL EXECUTIVES GREET RAILROAD OFFICIALS

Sir Henry Thornton, chairman of the Canadian National Railways system, and a party of railroad officials, while in Tulsa last week as guests of the Tulsa Traffic Club, were greatly interested in oil developments. The occasion was regarded as particularly important in bringing together so many Mid-Continent oil executives and railroad representatives from all sections and thus promoting better understanding through personal contact.

W. G. Skelly, as president of the Chamber of Commerce, entertained the visitors at breakfast at the Tulsa club on arrival. A. F. Winn, traffic manager of the Skelly Oil Co., conducted Sir Henry and his party to the breakfast, along with H. W. Roe, S. B. Meyers and Harold Evans. The Tulsans at the breakfast included R. P. Brewer, R. C. Sharp, Alf G. Heggem, and W. C. Franklin.

D. W. Moffitt, of the Mid-Continent Petroleum Corp., made the address of welcome at the annual banquet of the Traffic Club at the Mayo Hotel Friday evening.

"There is a close connection between Tulsa and Canada," Sir Henry said, "and it is not even suspected by a majority of people in either place. There are vast amounts of crude oil from about Tulsa used in Canadian industries."

## BUYS JOBBING COMPANY

CHICAGO, Feb. 25.—The Pennaoil Co., of Oil City, Pa., has bought what is stated to be a controlling interest in the stock of the Columbian Refining Co., of Cleveland, Ohio. No change in management is contemplated at present but the distribution in northern Ohio is to be increased.

## CRUDE OIL PRICES

(Continued from Page 213)

Lytton Springs (Lockhart) See gravity table
Somerset ..... See gravity table

*Posted by Magnolia Petroleum Co. Thrall prices same as North Central Texas less 19½ cents per cwt. freight.
†Magnolia Petroleum Co., Humble Oil & Refining Co., Crown Central Pipe Line Co.

### ROCKY MOUNTAIN STATES

**Ohio Oil Co.-Midwest Refining Co.**
(Effective March 14)

| | |
|---|---|
| Rock Creek, Wyo. (March 12) | $1.81 |
| Salt Creek | See gravity table |
| Big Muddy (March 12) | 1.81 |
| Mule Creek (May 1) | 1.10 |
| Grass Creek, heavy | .90 |
| Grass Creek, light | 1.15 |
| Elk Basin (March 12) | 1.35 |
| Lance Creek (March 12) | 1.30 |
| Poison Spider | 1.00 |
| Notches | .85 |
| Rex Lake (February 22) | 1.10 |
| Osage | 1.25 |
| Lost Soldier (contract) | .80 |
| Greybull-Torchlight | 1.15 |
| Hamilton Dome | .85 |
| Cat Creek (Mont.) | 1.25 |
| Sunburst (Mont.) (Jan. 25, 1928) | 1.50 |
| Artesia (March 12) | 1.00 |
| Hogback (N. Mex.) (March 14) | 1.10 |

Note: Salt Creek, Osage, Cat Creek, Greybull and Hogback posted by Midwest Refining Co., and the remainder by the Ohio Oil Co. Both companies post Grass Creek light and Elk Basin.

### EASTERN STATES

**Joseph Seep Purchasing Agency**
(Effective December 17)

| | |
|---|---|
| Penna Grade Oil in New York Transit Line (New York) | $2.00 |
| Bradford District Oil in National Transit Lines (Pennsylvania) | 2.00 |
| Penna Grade Oil in National Transit Lines (Pennsylvania) | 2.00 |
| Penna Crude Oil in Southwest Pennsylvania Lines (West Virginia) | 2.00 |
| Penna Grade Oil in Eureka Pipe Line Lines (Pennsylvania) | 2.00 |
| Penna Grade Oil in Buckeye Pipe Line lines (Ohio) | 2.00 |
| Cabell Grade Oil in Eureka Pipe Line lines (West Virginia) (February 9, 1928) | 1.35 |
| Corning 35-cent grade oil in Buckeye Pipe Line Co.'s line (December 19) | 1.40 |
| Corning 25-cent grade oil in Buckeye Pipe Line Co.'s lines (December 19) | 1.40 |
| Somerset Oil in Cumberland Pipe Line lines (Kentucky) (February 9, 1928) | 1.40 |
| Ragland Grade oil in Cumberland Pipe Line lines (Kentucky) (August 1) | .80 |
| Keister (Pennsylvania) (August 1) | 1.10 |

### MIDDLE WESTERN STATES

**Ohio Oil Co.**
(Effective March 14, 1927)

| | |
|---|---|
| Lima (February 10) | 1.51 |
| Wooster | 1.57 |
| Illinois (Feb. 23, 1928) | 1.50 |
| Indiana (Feb. 10, 1928) | 1.52 |
| Princeton (Feb. 23, 1928) | 1.50 |
| Plymouth (Feb. 23, 1928) | 1.57 |
| Waterloo (Nov. 17, 1926) | 1.55 |
| *Western Kentucky | 1.10 |
| **Saginaw, Mich., Saginaw Sand (May 27) | 1.60 |
| **Saginaw, Mich., Berea Sand (May 27) | 1.80 |
| †Cumberland, Clay, Barren, Clinton and Monroe Counties, Kentucky (March 16) | 1.50 |
| ‡Oil in lines of Stoll Oil Refining Co. in Oil City, Ky. (March 16, 1927) | 1.50 |
| §Oil Springs (Canada) (February 10, 1928) | 2.35 |
| §Petrolia (Canada) (February 10, 1928) | 1.50 |

*Posted by Ohio Oil Co.
†Posted by Paragon Development Co.
‡Posted by Stoll Oil Refining Co.
§Posted by Imperial Oil Co., Ltd.
**Posted by Sun Oil Co.

### MEXICAN CRUDE

Note—Due to the fact that the exportation of Tuxpam light crude oil has become a negligible factor, prices will no longer be published.

*Panuco heavy (f.o.b. Mex. ports) ...$1.15

*$.15.

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# Vacuum to Enter Gasoline Marketing

## Increase of Capital Proposed. Oil Securities Now Thought to Be Under Accumulation on Exchange

There was one bright day in the oil stocks last week, Thursday, after the news of crude changes in Mid-Continent became general. There was excellent buying strength apparent, and except for this day, the oils were exceptionally quiet. It is thought they are now under accumulation.

The annual financial statement of oil companies, while naturally discounted, have failed to strengthen the position of the oils, although their poor showings were anticipated. During the past week, Houston Oil and Prairie Oil & Gas figures were published.

Prairie Oil & Gas 1927 net income was $2,679,222 or $1.11 per share against $15,962,367 or $6.56 per share in 1926. The Houston Oil statement showed that after preferred dividends balance in 1927, this stock earned $7.57 per share against $6.77 per share in the previous year. The statement caused Houston to sell "Ex-Mystery" as rumors were current during the year when it touched 175, that the earnings would be several times what they were in 1926.

Prairie Pipe Line Co.'s net income for 1927 was $18,327,711 or $22.62 per share against $14,446,787 or $17.83 per share in 1926.

### Crystal Oil

The income account of the Crystal Oil Refining Corp. for the calendar year 1927, compares with that of the period from February 17 to December 31, 1926, as follows:

| | Yr. 1927 | Feb. 17-Dec. 31, 1926 |
|---|---|---|
| Gross income | $7,005,241 | $6,887,774 |
| Expenses and ordinary taxes | 6,698,227 | 6,406,915 |
| Interest and deprec. | 247,017 | 171,107 |
| Federal taxes | ..... | 30,423 |
| Profit before Federal taxes | $ 59,995 | $ *279,329 |

*After Federal taxes.

### Vacuum Oil

An ambitious expansion program is about to be undertaken in this country and abroad by the Vacuum Oil Co., it was disclosed in connection with the announcement of a proposal to increase the authorized capital stock from $70,000,000 par value to $175,000,000 to provide for a stock dividend of 100 per cent.

George P. Whaley, president of the Vacuum, in making public the details of the proposed capital readjustment, said the company was considering the establishment of a gasoline and kerosene distributing business in the British Isles. The company is now engaged chiefly in the marketing of trade-marked lubricants and related products. Decision to enter the gasoline and kerosene business in Great Britain may mean, it was said, that the company intends eventually to enlarge its business in the United States in the same way.

Mr. Whaley said the management, in recommending an increase in the authorized capital stock from $70,000,000 to $175,000,000, had in mind, besides providing for a stock dividend of 100 per cent, creating a reserve of stock that could be used "from time to time for acquisition of properties or shares of other companies as in the judgment of the directors the needs of the business may necessitate."

The company, in order to declare the proposed 100 per cent stock dividend, will have to increase the number of its outstanding shares from 2,498,832 to 4,997,664. It is planned, however, to increase the number of authorized shares from 2,800,000 to 7,000,000, so that there will be left, after the stock dividend, 3,002,334 shares of unissued capital stock. There will be no change in the $25 par value. The present outstanding 2,498,832 shares of capital stock has a market value of about $367,000,000.

Mr. Whaley indicated that the additional stock to be authorized in excess of the amount required for the 100 per cent stock dividend would be used for expansion purposes that are not related to the plan for marketing gasoline and kerosene in the British Isles. He would not identify the properties which it is proposed to acquire in this country. The English expansion, it was indicated, will be financed with cash, with which the Vacuum is well supplied. Mr. Whaley said that there had been conferences with officials of the Anglo-American Oil Co., Ltd., which is a large marketing company in the British Isles, but he would not confirm reports that the Vacuum and that company are jointly organizing a marketing company to enter the British field. The Vacuum and the Anglo American, he said, have common interests, and the officials of the two companies are in consultation frequently.

The Vacuum president made public the letter sent to his company's stockholders, explaining the proposed capital readjustment and 100 per cent dividend. The plan is to be ratified at the annual meeting March 31.

Of the additional stock to be authorized, $10,000,000 is to be set aside for issuance to employes under conditions fixed in the second stock purchase plan of the company. Part of the stock is to be used as a "bonus or special compensation" to officials or employes, at a price to be fixed by the directors, "which price shall be approximately the average market price for the shares for the three months preceding the issuance."

### British American Oil

At the annual meeting of the British American Oil Co. held at Toronto, it was stated that the stock will be placed on a $1 annual dividend basis by the declaration of a quarterly dividend of 25 cents, payable April 2. Previously the company has been paying 20 cents quarterly, with an extra dividend of 20 cents in the last quarter.

S. R. Parsons, chairman of the British American Oil Co., told stockholders that considerable losses were incurred by the company in the earlier part of last year owing to the excess crude oil production and lower prices of crude and refined oil products. "Large stocks of crude oil on hand at the refining plants and finished products in storage and at branches throughout the country had to be depreciated in value to correspond with reduced prices. Notwithstanding these losses, the company, owing to its great expansion of business in Ontario, Quebec, Manitoba, Saskatchewan and Alberta, where it carries on operations, was able to show a splendid advance over 1926, thus constituting a record year in the history of the company in achievement and profit.

"Large additions and extensions were made to two refining plants, and many new branches, as well as service stations, were erected both in eastern and western divisions. Nearly $2,000,000 was spent in these betterments."

### Buckeye Pipe Line

The report of the Buckeye Pipe Line Co. for the year ended December 31, 1927, shows net income of $981,036 after taxes and charges, equivalent to $4.90 a share (par $50) earned on 200,000 shares of stock. This compares with $1,046,118 or $5 23 a share in 1926. In 1926 the company received in addition to the above earnings a refund of $282,825 in Federal taxes in final settlement up to December 31, 1924, which was carried to profit and loss account.

The statement for 1927 compares with 1926 as follows:

| | 1927 | 1926 |
|---|---|---|
| Net income | $ 981,036 | $1,046,118 |
| Dividends | 800,000 | 1,000,000 |
| Surplus | $ 181,036 | $ 46,118 |
| P. & L. Surplus | 3,169,753 | 3,238,717 |

The balance sheet of the Buckeye Pipe Line Co. as of December 31, 1927, compares with the close of 1926 as follow:

| Assets | | |
|---|---|---|
| Plant | $19,901,967 | $19,529,677 |
| Other assets | 179,090 | 178,877 |
| U. S. Govt. bonds | 2,024,372 | ..... |
| R. R. and Munic. bonds | 2,588,308 | ..... |
| *Cash | 270,473 | †5,727,979 |
| Accts. receivable | 1,199,142 | ..... |
| Total | $26,163,352 | $25,436,533 |
| **Liabilities** | | |
| ‡Capital stock | $10,000,000 | $10,000,000 |
| Accounts payable | 327,297 | $2,053,240 |
| Tax reserve | 307,556 | ..... |
| Res. for insurance, etc. | 1,560,813 | ..... |
| Depreciation reserve.. | 10,797,932 | 10,144,576 |
| Surplus | 3,169,754 | 3,238,717 |
| Total | $26,163,352 | $25,436,533 |

*Par $50. †Includes other investments and accounts receivable. ‡Includes reserve for taxes, insurance, etc.

### Louisiana Oil

The preliminary statement of the Louisiana Oil Refining Co. for the year ended December 31, 1927, shows net profit of $188,622 after interest, depreciation, amortization, drilling expense and Federal tax, equivalent to $4.71 a share earned on 40,000 shares of 6½ per cent preferred stock. This compares with net profit of $2,039,376, equal after 6½ per cent preferred dividend requirements to $1.61 a share on 1,140,063 no-par shares of common stock in 1926.

The consolidated income account for the year 1927 compares with 1926 as follows:

| | 1927 | 1926 |
|---|---|---|
| Operating net | $2,075,903 | $4,257,365 |
| Deductions | 238,325 | 99,886 |
| Balance | $1,837,578 | $4,157,479 |
| *Other income | 230,727 | ..... |
| Total income | $2,068,305 | $4,157,479 |
| Interest | 96,333 | 224,671 |
| Depr. and depletion | 1,417,070 | 1,361,565 |
| Drilling expense, etc. | 345,322 | 205,269 |
| Federal taxes | 20,958 | 226,590 |
| Net profit | $ 188,622 | $2,039,376 |
| Preferred dividends | ..... | 195,000 |
| Surplus | $ 188,622 | $1,844,376 |

*Net profit on sale of investments.

### New York Transit

The New York Transit Co. for the year ended December 31, 1927, reports net loss of $69,433 after taxes and depreciation. This compares with net income of $106,066 or $2.12 a share on 50,000 shares of stock in 1926.

| | 1927 | 1926 |
|---|---|---|
| Net loss | $69,433 | $106,066 |
| Dividends | ..... | 112,500 |
| Deficit | $69,433 | $ 6,434 |

The balance sheet of the New York

(Continued on Page 222)

### LIST OF ACTIVE PETROLEUM STOCKS

| Stocks— | Par | Clos. Quot. Feb.27 | Feb.20 | 1928 High | Low | 1927 High | Low | 1926 High | Low |
|---|---|---|---|---|---|---|---|---|---|
| Amerada Corp. | .. | 30 | 27½ | 32¾ | 27½ | 37½ | 27⅝ | 32⅞ | 24¾ |
| Atlantic Refining, com. | 100 | 102 | 97⅞ | 109⅞ | 95⅝ | 131⅝ | 107 | 128⅝ | 97 |
| Barnsdall "A" | 25 | 22⅜ | 22⅛ | 26½ | 22⅛ | 35½ | 20⅜ | 32½ | 23½ |
| California Petroleum, com. | 25 | 25¼ | 24½ | 26⅞ | 24 | 32⅞ | 20 | 38¼ | 30⅞ |
| Houston Oil | 100 | 128¼ | 129⅞ | 156⅛ | 127⅞ | 175⅜ | 60⅛ | 75 | 50¼ |
| Independent Oil & Gas | .. | 26⅝ | 22⅜ | 28¼ | 21⅜ | 32⅜ | 17⅝ | 34 | 20¼ |
| Louisiana Oil | 10 | 10¼ | 9⅜ | 12⅜ | 9⅜ | 18⅛ | 10⅛ | 15⅝ | 12 |
| Maracaibo | .. | 13½ | 12⅛ | 18⅛ | 12½ | 22⅜ | 12 | 27⅜ | 18⅝ |
| Marland | .. | 34⅜ | 33¼ | 38⅝ | 33 | 58⅛ | 31 | 63⅜ | 41¼ |
| Mid-Continent Petroleum | .. | 25⅝ | 25¼ | 29½ | 25⅛ | 39⅜ | 25⅛ | 41 | 25⅝ |
| National Supply | 50 | 90 | 90½ | 96½ | 90 | 98⅜ | 76 | 84⅛ | 55½ |
| Oil Well Supply | 25 | 34½ | 33⅛ | 41 | 34½ | 44⅜ | 31¼ | 36 | 30 |
| Pan American, B | 50 | 40 | 38 | 46⅝ | 37⅝ | 66⅜ | 45⅛ | 72⅝ | 56⅛ |
| Pan American, Western B | .. | 19¼ | 18 | 21 | 18¼ | 37⅞ | 16⅝ | 46 | 34 |
| Phillips Petroleum | .. | 37½ | 35⅝ | 43½ | 35⅛ | 60¼ | 36½ | 54⅞ | 42⅛ |
| Producers & Refiners | 50 | 18⅝ | 17 | 26 | 16 | 33⅛ | 16⅝ | 26 | 11 |
| Pure Oil, com. | .. | 20⅝ | 20⅛ | 27½ | 19 | 33⅛ | 25 | 31 | 25⅝ |
| Royal Dutch, N. Y., sh. | 13.40 | 46 | 46½ | 48⅝ | 44⅝ | 54½ | 44¼ | 57⅜ | 49⅝ |
| Shell Transport | 10 | 42⅝ | 42⅜ | 42⅞ | 39⅝ | 49 | 41½ | 48⅞ | 42 |
| Shell Union, com. | .. | 25 | 24½ | 26⅞ | 23¼ | 31⅜ | 24⅝ | 30⅝ | 24 |
| Simms Petroleum | 10 | 20½ | 18½ | 24⅝ | 18½ | 23⅞ | 14¼ | 25⅝ | 16½ |
| Sinclair Consolidated | .. | 19½ | 17½ | 21¼ | 17½ | 22⅝ | 15⅛ | 24⅞ | 16⅜ |
| Skelly Oil | 25 | 25⅝ | 25⅜ | 28⅛ | 25 | 37⅝ | 24⅛ | 37⅛ | 27 |
| Standard of California | 25 | 53⅝ | 53⅝ | 56⅝ | 53⅝ | 60⅝ | 50⅝ | 62½ | 54 |
| Standard of New Jersey, com. | 25 | 38⅝ | 37⅞ | 40½ | 37⅝ | 41⅝ | 35⅛ | 46⅝ | 37½ |
| Standard of New York | 25 | 28⅝ | 29 | 31⅝ | 28⅜ | 34½ | 29⅜ | 41¼ | 30⅝ |
| Sun Oil Co. | .. | 37 | 35⅛ | 39⅞ | 31½ | 34⅞ | 30 | 41¼ | 30⅜ |
| The Texas Company | 25 | 51⅞ | 50⅝ | 55⅝ | 50 | 58 | 45 | 58 | 48 |
| Texas Pacific Coal & Oil | 10 | 13⅜ | 12⅞ | 17 | 12⅝ | 18⅞ | 12 | 19½ | 12⅛ |
| Tide Water Associated | .. | 15⅛ | 15 | 17¼ | 14⅜ | 19¼ | 15⅜ | 21 | 17 |
| Transcontinental | .. | ⅝ | ⅝ | 1⅛ | ⅝ | 10⅜ | 3⅜ | 5½ | 3 |
| Union Oil of California | 25 | 44 | 43¼ | 45¼ | 42⅝ | 56½ | 39⅝ | 53⅜ | 37¼ |
| Union Tank, com. | 100 | 117 | 121⅝ | 125 | 119¼ | 126 | 94 | 120⅝ | 84¼ |
| White Eagle Oil & Refining | .. | 20¼ | 20¼ | 24¼ | 20¼ | 27½ | 21⅝ | 29⅝ | 25½ |
| **Standard Oils** | | | | | | | | | |
| Anglo-American Oil | £1 | 20⅝ | *19¼ | 21⅜ | 18½ | 21⅝ | 17⅛ | 19¾ | 16½ |
| Borne Scrymser | 25 | 52 | *53 | 56 | 50 | 69 | 49½ | 75 | 65 |
| Buckeye Pipe Line | 50 | 59½ | *59 | 63 | 58 | 59 | 45 | 59½ | 42 |
| Chesebrough Manufacturing Co. | 25 | 125 | *125 | 149⅝ | 120 | 126 | 76½ | 81¼ | 63 |
| Continental | 10 | 17¼ | 16¼ | 23 | 16 | 22⅝ | 16¼ | 25⅞ | 10¼ |
| Cumberland Pipe Line | 100 | 103¼ | *102 | 105 | 94 | ‡137 | 90 | 147 | 102 |
| Eureka Pipe Line | 100 | 66 | *67 | 70 | 64⅛ | 66 | 47 | 43¾ | 43 |
| Galena Signal, com. | 100 | 5 | *4⅜ | 6½ | 4 | 13½ | 4½ | 32½ | 9⅞ |
| Humble Oil & Refining Co. | 25 | 60⅞ | 59¼ | 68 | 59¼ | 67⅝ | 54 | 99⅝ | 52 |
| Illinois Pipe Line | 100 | 182¼ | 181¾ | 187½ | 176½ | 181½ | 123⅜ | 144 | 131 |
| Imperial Oil | .. | 59 | 58⅞ | 65¼ | 56⅞ | 64¾ | 37⅜ | 39⅝ | 32½ |
| Indiana Pipe Line | 50 | 75¼ | 75 | 78⅝ | 75 | 93 | 61 | 68 | 52¾ |
| International Petroleum Co. | 10 | 36⅝ | 35 | 43 | 35 | 36⅝ | 28¼ | 35¼ | 28¾ |
| National Transit Co. | 12.50 | 24½ | *22½ | 23⅞ | 20⅛ | 23¼ | 13¼ | 30⅝ | 27¼ |
| New York Transit | 100 | 49½ | *48 | 48 | 38½ | 42 | 31¼ | 61½ | 27¼ |
| Northern Pipe Line | 100 | 105⅜ | *105 | 103 | 94 | 96 | 70 | 80½ | 64 |
| Ohio Oil Co. | 25 | 59¾ | 58½ | 66¾ | 58½ | 66 | 52 | 67¾ | 55¾ |
| Penn-Mex Fuel | 25 | 37½ | *33 | 39⅞ | 33 | 36½ | 12 | 24¼ | 15 |
| Prairie Oil & Gas | 25 | 48¼ | 48 | 50¼ | 48 | 55½ | 45⅝ | 60¼ | 49 |
| Prairie Pipe Line | 100 | 208 | 207 | 216 | 184 | 189¼ | 132 | 137½ | 122½ |
| Solar Refining Co. | 100 | 176 | *175 | 178 | 175 | ‡201½ | 178 | 212 | 184½ |
| South Penn Oil | 25 | 39 | *37¼ | 40½ | 36¾ | 41½ | 34½ | 50 | 30 |
| Southwest Pa. Pipe Line | 100 | 94½ | *90 | 88¾ | 70 | 78 | 55½ | 56 | 47½ |
| Southern Pipe Line | 50 | 26 | *23 | 33½ | 21 | 39 | 18½ | 27 | 34 |
| Standard of Indiana | 25 | 75¼ | 71⅝ | 80½ | 71¼ | 80¼ | 64⅝ | 70½ | 60½ |
| Standard of Kansas | 25 | 15½ | 15¼ | 17 | 15 | 20⅞ | 15⅝ | 36½ | 16½ |
| Standard of Kentucky | 25 | 126½ | 124¾ | 133 | 124 | 125½ | 111½ | 134⅝ | 107 |
| Standard of Nebraska | 25 | 40⅝ | 41 | 43 | 40½ | 49¼ | 43 | 51¼ | 42 |
| Standard of Ohio, com. | 100 | 33⅜ | 73 | 79¾ | 73 | 81½ | 72 | 362 | 192½ |
| Swan & Finch, com. | 25 | 16 | 16½ | 17¾ | 16½ | 21 | 14½ | 21 | 18 |
| Vacuum Oil | 25 | 144¾ | 138¼ | 149 | 136⅝ | 147 | 95⅛ | 109⅝ | 94⅛ |
| **Miscellaneous** | | | | | | | | | |
| Gulf Oil Corp. of La. | 25 | 108⅞ | 101¼ | 117¼ | 101¼ | 116 | 86¼ | 95 | 82½ |

*Bid, no sales. †Old stock. ‡New stock. §Ex-dividend.
Quotations furnished by W. J. Wollman & Co.

The Oil and Gas Journal's weekly average price of 20 representative petroleum stocks listed on the New York Stock Exchange and New York Curb was as follows:

| | | | | | | |
|---|---|---|---|---|---|---|
| Feb. 27 | 62.54 | Jan. 23 | 63.49 | Dec. 19 | 63.24 |
| Feb. 20 | 60.77 | Jan. 16 | 63.87 | Dec. 12 | 62.07 |
| Feb. 13 | 61.03 | Jan. 9 | 63.55 | Dec. 3 | 62.06 |
| Feb. 6 | 62.03 | Dec. 31 | 62.09 | Nov. 28 | 62.92 |
| Jan. 30 | 62.75 | Dec. 27 | 62.86 | Nov. 21 | 63.66 |

## RECIRCULATING FURNACE AT OIL REFINERIES

(Continued from Page 209)

reradiation to the exposed tubes of the still. The layout is applied to a Jenkins still and the method of the distribution of the gases is patented by the Combustion Equipment Co.

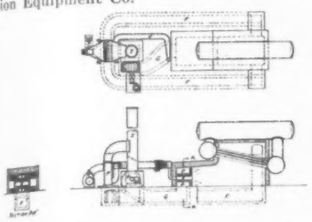

*Figure 15—Single end-fired recirculating still.*

Figure 16 illustrates an application of recirculation to industries outside of oil refining, which is quite different from those common to stills. The method consists of drawing the flue gases over a carborundum combustion chamber which radiates a considerable amount of the heat through the carborundum and preheats the recirculated gases to a high

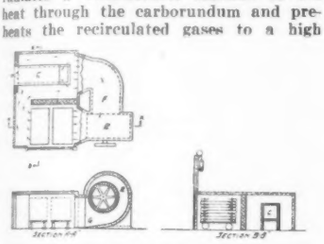

*Figure 16—Recirculating drawing furnace.*

temperature before they are actually mixed with the fresh products of combustion. The difference in temperature between the products of combustion and the recirculated gases is made very small; therefore the danger of stratification or channeling of these gases is reduced to a minimum. The scheme shows the combustion chamber on the suction end of the recirculating fan to obtain an intimate mixing of recirculating and fresh gases within the fan itself. The arrangement as shown is applicable only to low furnace-operating temperatures, usually below 1,000 degrees Fahrenheit. For application at higher temperature the combustion chamber is placed on the discharge end of the fan and the final mixing is obtained in a separate mixing chamber, or by means of baffles and checker work in the entrance to the heating chamber itself.

The number of industries using the recirculating furnace, and the number of recirculating furnaces in each of these industries, shows that the recirculating furnace is at present completely out of the experimental stage and is gradually emerging from the phase of rapid and quite often radical changes of design and operation. There are at least three manufacturers of hot-gas fans that have at present perfected their fans to a stage where they will be as reliable in operation as any other piece of refinery equipment with moving parts.

The power consumption of the latest designs of fans is very low. An electrically driven recirculating fan which is responsible for a saving of approximately 52 bbls. of fuel per day uses 10 horsepower per hour.

The initial cost of recirculating fans is constantly forced down by the newly developed competition.

In general, the recirculating furnace is at present similar to the auto of 10 years ago—not the almost perfect piece of machinery that is the 1928 model; yet a conveyance that will take you there and usually bring you back without the necessity for "getting out and under," as was the case with the 1904, 1905 and 1906 auto models.

While not a cure-all for the ills of refinery heating, the recirculating furnace, properly designed and equipped, will produce a milder heat application, give larger throughput with the same amount of heating surface, and perform the heating with less fuel and better efficiency than the non-recirculating convection furnace, and in many cases the radiant-heat furnace as well.

### Appendix 1

Nomenclature.

$W_t$ = total weight of gases passing over the heating absorbing surface, pounds.

$F$ = weight of fuel, pounds.

$W_f$ = weight of fresh products of combustion, pounds.

$W_r$ = weight of recirculated gases, pounds.

$W_a$ = weight of air per 1 pound of fuel.

$Q_c$ = heat content of fresh products of combustion at their initial temperature, B.t.u. per pound.

$Q_1$ = heat content of products of combustion at their initial temperature, B.t.u. per pound.

$Q_2$ = heat content of products of combustion at their final temperature, B.t.u. per pound.

$Q_a$ = heat content of air due to preheat, B.t.u. per pound.

$Q_f$ = heating value of fuel, B.t.u. per pound = 18,500

$$W_f Q_c + W_r Q_2 = W_t Q_1 \quad (1)$$

(Heat in fresh prod. of comb. | Heat in re-circ. gases | Heat in total gases)

$$W_f + W_r = W_t \quad (2)$$

Substituting the value of $W_t$

$$W_f Q_c + W_r Q_2 = (W_f + W_r) Q_1$$

$$W_r (Q_c - Q_1) = W_r (Q_1 - Q_2)$$

$$W_r = W_f \frac{(Q_c - Q_1)}{Q_1 - Q_2}$$

$$R = \frac{W_r}{W_f} = \frac{Q_c - Q_1}{Q_1 - Q_2}$$

### Appendix 2

No recirculation: No recuperation.

Heat available per pound of gases, cooling from 1,500 degrees Fahrenheit to 1,050 degrees Fahrenheit (from Figure 1).

$$389 - 261 = 128 \text{ B.t.u.}$$

Total weight of gases required to deliver tube surfaces, 8,000,000 B.t.u.

$$8{,}000{,}000 \div 128 = 62{,}500 \text{ pounds}$$

Heat content of gases before passing over the tube surfaces,

$$389 \times 62{,}500 = 24{,}300{,}000 \text{ B.t.u.}$$

Total heat required, including 500,000 B.t.u. losses in furnace,

$$24{,}300{,}000 + 500{,}000 = 24{,}800{,}000 \text{ B.t.u.}$$

Weight of fuel required, $24{,}800{,}000 \div 18{,}500 = 1{,}320$ pounds.

Oil heating efficiency, $8{,}000{,}000 \div 24{,}800{,}000 = 32.2$ per cent.

Even without air preheat or recirculation, the weight of fuel used is negligible compared to the total weight of gases ($1{,}320 \div 62{,}500 = 2.1$ per cent). With recirculation and preheat and the consequent savings in the amount of fuel used, the weight of fuel can be neglected in the calculations, and the weight of air used for combustion can be assumed equal to the weight of the fresh products of combustion. The following calculations were made on this basis:

No Recirculation: Air Preheat, 800 degrees Fahrenheit Net

Heat content of 1 pound of air at 800 degrees Fahrenheit preheat = 178 B.t.u. (Figure 1)

$$24{,}800{,}000 = F + 62{,}500 \times 178$$

(Total heat | Heat from fuel | Heat from air preheat)

$$F = 13{,}700{,}000$$

Oil heating efficiency

$$8{,}000{,}000 \div 13{,}700{,}000 = 58.3 \text{ per cent}$$

Recirculation, 3 : 1; Air Preheat, 500 degrees Fahrenheit

Heat content of 1 pound of air at 500 degrees Fahrenheit preheat = 109 B.t.u. (Figure 1)

Weight of recirculated gases,

$$62{,}500 \times \frac{3}{3+1} = 46{,}875 \text{ pounds}$$

Weight of fresh products of combustion = 15,625 pounds.

$$24{,}800{,}000 = F + 15{,}625 \times 109$$

(Total heat | Heat in fuel)

$$F = 10{,}900{,}000 \text{ B.t.u.}$$

Oil heating efficiency

$$8{,}000{,}000 \div 10{,}900{,}000 = 73.4 \text{ per cent.}$$

## ROCKY MOUNTAIN AREA

(Continued from Page 203)

a water well and did not show any oil when it was drilled. After making water for many months for near-by leases, the well started making oil and last week it went on a rampage. It was shut in for a time then the pressure broke the control head and the well went wild, flowing an estimated 18,000 bbls. of oil in 24 hours.

Trucks fitted with tanks are busy trying to salvage some of the oil that is flowing down the coulees near the well in large streams. All tankage about the well is filled and running over. Before the tanks were filled, the well filled 250-bbl. tanks at the rate of one each hour through a 2-inch line. This lead line was stripped out of the control head when the well went wild.

The syndicate owning the well is incorporated for $45,000 and a tract of 80 acres adjoining this lease sold the past week for $625 per acre. This tract was sold to Spokane capital from the Pacific Coast.

The discovery well on the Pondera Dome, Pondera County, was opened the past week after being shut in since it was drilled last fall. The well flowed some oil with the gas pressure and there did not appear to be any diminution of pressure since the well was last measured. Other wells are to be drilled the coming season in this structure in spite of the dusters already put down.

**ROCKY MOUNTAIN PRODUCTION**
**Runs From the Field**

| | |
|---|---|
| **Wyoming** | |
| Salt Creek | 37,280 |
| Big Muddy | 2,720 |
| Grass Creek | 2,400 |
| Elk Basin | 1,030 |
| Greybull | 10 |
| Dutton Creek | .... |
| Rock River | 2,740 |
| Lance Creek | 620 |
| LaBarge | 970 |
| Mule Creek | .... |
| Poison Spider | 210 |
| Hamilton | 1,220 |
| Osage | 380 |
| Lander | 700 |
| Ferris | 6 |
| Byron | 30 |
| Lost Soldier | 3,210 |
| Simpson Ridge | 30 |
| Total Wyoming | 53,556 |
| **Montana** | |
| Cat Creek | 1,800 |
| Lake Basin | 170 |
| Kevin-Sunburst | 9,000 |
| Total Montana | 10,970 |
| **Colorado** | |
| Florence | 1,162 |
| Moffat | 1,176 |
| Fort Collins | 3,135 |
| Iles Dome | 1,832 |
| Rangely | 100 |
| Tow Creek | 351 |
| Boulder | 25 |
| Total Colorado | 7,781 |
| **New Mexico** | |
| Rattlesnake | 319 |
| Hogback | 530 |
| Cap Rock | 231 |
| Table Mesa | 232 |
| Artesia | 1,268 |
| Total New Mexico | 2,580 |
| Total Rocky Mountain | 74,887 |

## SULPHUR PROBLEM IS LESS SERIOUS—EGLOFF

(Continued from Page 37)

the paper on that district by C. P. Watson, of the Federal Royalties Co., disagreed with the latter on the ultimate production estimate. Mr. Fohs said:

"I feel that Mr. Watson's estimate on the Yates Pool future production is too high; in fact about 100,000,000 bbls. too high, although I think the district, exclusive of the Panhandle, may ultimately yield something near the total he names.

"Prediction of a year ago for West Texas, including the Panhandle, having a potential reserve of 3,000,000,000 bbls. can now be greatly discounted, for wildcats of the year have eliminated much territory. Thus we can eliminate the southern half of Pecos County, Terrell County, practically all of Crockett, Val Verde, Reeves, Loving and Brewster, as areas having any very worthwhile pools. The northern half of Pecos has also been badly hit and new pools therein are now limited to a few possibilities and to deeper horizons. A few additional possibilities occur in Ward, Winkler, Upton, Ector Counties of Texas, and in Lea County in New Mexico, but the major large area pools in these counties appear opened with one or two possible exceptions.

"The water drive in these pools is undoubtedly a great factor and should make for high recovery, as well as quick exhaustion and rapid decline.

"In the face of the low price at which Venezuela oil can be laid down on the Atlantic Seaboard, one immediately is struck at the uneconomic production of West Texas oil at this time, considering the high transportation cost to the Gulf or refineries. Low cost of production is partly offset by the high cost of treating.

"A deep and higher grade sand will produce from part of these pools, but its production does not bid fair to be but a small percentage of that from the present sand. This sand is not a menace to the industry."

### Foreign Developments

Speakers at the closing session were Walter Miller, Marland Refining Co., on refinery engineering; Joseph B. Umpleby, Goldelline Oil Co., on production engineering; F. J. Fohs, who read the paper prepared by W. E. Wrather, on production, and Joseph E. Pogue, on economics. The following brief summary by Mr. Fohs on foreign developments was given:

"Mexico is producing less but with better understandings about to be reached further development may be looked for. Venezuela can readily produce more oil and is restricted largely by the number of lake tankers available. It is producing about 225,000 bbls. per day and with the completion of additional tankers this may be increased another 40,000 or 50,000 bbls. A number of new isolated productive fields have shown oil but none was productive in 1927.

"While there has been some increase in production in Russia and a number of minor new finds, only one, that of the Puta structure, seems to be important. A new field has also been opened in Turkestan but developments here will probably not be felt outside of Turkestan itself.

"The bringing in of a large well of light oil in Irak by the Turkish Petroleum Co., thus showing possibilities similar to the Persian fields which, by the way, have been so very profitable because sensibly controlled, is an event of first importance."

## ALL HELIUM IS MADE IN MID-CONTINENT

(Continued from Page 40)

tendency to clog the small tubes used in the process. After the carbon dioxide is removed, the gas is sent through the gasoline plant, where the gasoline content is eliminated. The gas is then sent into the plant proper where it is compressed to 350 pounds pressure.

The main equipment in the plant consists of two 185 horsepower Cooper gas engines direct connected to two stage compressors, and one small 50 horsepower Cooper unit. The actual processing apparatus consists of a separating column with a large number of small copper tubes of one-eighth-inch diameter, and a series of heat exchangers.

### Method of Operation

The gas is taken to the compressors and raised to 350 pounds pressure. Before it is sent into the separating column this pressure is increased to 2,000 pounds. By decreasing the pressure from 2,000 pounds to atmospheric, there is a gradual change in the temperature of the gases, and the work of the heat exchangers functions to decrease the temperature of the various elements in the gases to the liquefaction point. Any methane, nitrogen, and hydrogen are driven off in liquid form, and the decrease in temperature is continued until only the helium is left. The average helium manufactured at this plant is 96.5 per cent pure.

The gas left, after the helium is extracted is allowed to blow into the air. It is not salable gas, for on account of its 98½ per cent nitrogen content, it is noninflammable. The gas at the government plant at Fort Worth contains only 50 per cent nitrogen, and is therefore a combustible gas, and sold for heating purposes.

Formerly it was thought helium was found only in noncombustible gas, but in the Petrolia and Nocona fields of

North Texas, helium occurs in combustible gas.

When the helium process is completed, the product is immediately placed in cylinders which have a normal capacity of 1½ cubic feet. When compressed to 2,000 pounds pressure, these cylinders contain 175 cubic feet of helium, and they are shipped 600 cylinders in a car load. The Dexter plant has an annual capacity of 8,000,000 cubic feet of helium, and the government plant at Fort Worth is said to have an annual capacity of 6,000,000 cubic feet. The combined output of these plants hardly suffices to fill the government's requirements at this time.

The use of helium gas up to the present has been confined to filling the bags of dirigible airships. It replaced hydrogen gas, and was far more desirable on account of its noncombustible quality. At the outbreak of the war, helium commanded a price of $1,500 per cubic foot, and since an airship requires some 2,000,000 cubic feet to fill the bag, it would have cost $3,000,000,000 to fill the Los Angeles. Through industrial research, great reductions in cost were made, and in a plant which was operated during the war, helium cost $500 per cubic foot to produce. Progress resulted in the reduction of this cost to $75 per foot, and at the present time, helium is sold to the Government at $34.70 per thousand feet.

### Helium for Radios

Experiments in the use of helium for radio tubes has revealed some startling facts, and it is now believed that radio tubes filled with helium are far more efficient than vacuum tubes. The helium filled tubes are said to give a clearer sound, and have been declared a decided improvement on the older types of tubes. In this use, there seems to be a much larger potential output for helium, and owing to the fact that radio tubes require a helium which is 100 per cent pure, the cost of processing is greatly increased. According to reports, helium 100 per cent pure sold for radio tubes will command a price of $400 per cubic foot, and this figure will probably permit greater latitude in experimental work in the processing of helium.

Like many other products we still have new markets to find for helium.

*The Helium Co.'s plant at Dexter, Kans. In the foreground is the boilerhouse, immediately to the rear of this is the Southwestern Engineering Co.'s portable gasoline plant, and the structure on the left is the main building of the plant.*

## FRENCH CHAMBER PASSES OIL LAW

(Continued from Page 41)

by the American company. The suggestion has been made, in India of course, that the government should take steps to prevent the continuation of the present situation. So far as is known no actual steps in this direction have been taken.

### Russia

Soviet oil production for the calendar year 1927 was 10,413,000 metric tons, the largest annual output for 25 years, while exports amounted to 2,135,000 tons and were the largest on record. Production of oil was 18.4 per cent greater than in 1926, while exports showed an increase of 30 per cent over the preceding year. In 1927, Russia produced 1,200,000 tons more than in 1913, and oil exports were more than double those for the last prewar year.

The Soviet oil industry which had received a severe setback during the years of civil war and intervention in Russia has been reconstructed by the Soviet Government during the past four years at a cost of over $300,000,000. A considerable quantity of oil-well equipment for the Soviet oil industry has been purchased in this country. In 1927 orders were placed in the United States for drilling and refinery equipment amounting to $4,646,176, several times the purchases made in the preceding year.

In September, 1927, there were 3,365 wells in operation in the Soviet Republics as compared with 2,965 in the same month of the preceding year. Drilling was carried on at 600 wells in September as compared with 430 two years ago. Total drillings for the Soviet fiscal year 1926-27 ending September 30, 1927, amounted to 367,567 meters, 100,000 meters more than in 1913.

Information received from Grozny states that the electrification of that area will be almost complete during the current year. By the end of the year the number of electromotors will have been increased from 307 to 330. "Grozneft" is to spend more than 4,000,000 roubles on buildings in the old Grozny area, and 47 new derricks are to be erected. The output of non-paraffinous oil is to be greatly increased. In connection with the plans of the Soviet government to make a special export of gasoline during May to October, "Grozneft" is actively engaged in increasing the capacity of the gasoline refineries. The work of laying two railway lines, Gronzy-Touapse, and widening the sidings on the Armavir and Touapse line, is being hurriedly pushed forward.

### Rumania

Rumania at present has 1,366 producing petroleum wells of which 1,014 are located in the district of Prahova, 116 in the district of Damboyitza, 113 in the district of Buzau, and 123 in the district of Bacau.

According to preliminary estimates, crude production from these wells during 1927 totaled approximately 3,700,000 metric tons, or an increase of about 450,000 tons over 1926. However, there is some apprehension that during 1928 production will fall off, since it is estimated that about 300 new wells will be required to maintain the present output, while up to the present applications have been received for permission to drill only 194 new wells.

There is a decided tendency on the part of producers to turn their attention to more modern pumping equipment of the compressed air and gas types with a view to reducing production costs.

**RUMANIAN CRUDE PRODUCTION**

| | 1924 | 1925 | 1926 | 1927 |
|---|---|---|---|---|
| | | (Metric Tons) | | |
| For the month of November | 166,621 | 203,383 | 275,014 | 313,421 |
| January 1 to November 30 | 1,681,213 | 2,112,957 | 2,964,960 | 3,341,491 |

**RUMANIAN EXPORTS**

| | For the Month of Nov. | | Jan. 1 to Nov. 30 | |
|---|---|---|---|---|
| | 1926 | 1927 | 1926 | 1927 |
| | | (Metric Tons) | | |
| Gasoline | 54,808 | 36,625 | 395,561 | 516,156 |
| Refined oil | 53,778 | 64,264 | 475,717 | 670,594 |
| Lubricating oil | 9,673 | 2,898 | 41,022 | 58,929 |
| Residues (gas and fuel oils) | 46,640 | 67,453 | 453,049 | 604,532 |
| | 164,899 | 171,240 | 1,365,349 | 1,850,211 |

The following table gives the production of the leading petroleum companies for the first 11 months for 1927, together with the countries of origin of the capital invested in such companies:

| | Jan. 1 to Nov. 30, 1927 (Barrels) |
|---|---|
| Astra-Romana (Royal Dutch) | 4,030,657 |
| Creditual Minier (Rumanian) | 3,665,841 |
| Steaua-Romana (British, French and Rumanian) | 3,648,615 |
| Concordia and Sirius (Belgian, French and Rumanian) | 2,886,566 |
| Phoenix Oil and Transport Company (British) | 2,953,089 |
| Romano-Americana (S. O. of N. J.) | 1,550,026 |
| "I. R. D. P." (Rumanian) | 1,292,075 |
| "Colombia" (French) | 868,488 |
| Aquila Franco-Romana (French) | 301,567 |
| Petrol Block (Rumanian French) | 199,908 |
| Other companies | 3,284,271 |
| | 24,681,115 |

There is some apprehension that during 1928 production will fall off, since it is estimated that about 300 new wells will be required to maintain the present output, while up to the present applications have been received for permission to drill only 194 new wells.

There is a decided tendency on the part of producers to turn their attention to more modern pumping equipment of the compressed air and gas types with a view to reducing production costs.

### Poland

It is evident that the Polish authorities are seriously concerned over the continuously decreasing output of crude oil, which, concurrently with increasing internal consumption, raises the fear that Poland within a year or two will cease to be an oil-exporting country. With the hope, therefore, that the situation in this respect can be improved, and the considerable investment in oil refineries saved from becoming in time practically a total loss, the government last December enacted a decree designed to encourage the companies to extend their exploration activities. Refinery capacity in Poland is several times greater than present crude output. Well-informed authorities maintain that the government's oil policy is mainly inspired by a desire to salvage refineries that under sound economic conditions would be forced out of business. The state-owned Polmin refinery (the largest in Poland) is an object of especial concern on the part of the officials, yet, despite this, the refinery every year shows a considerable deficit. Other refineries and marketing organizations are greatly handicapped in their operations because of the determination of the government to keep the Polmin establishment in business. Later in December, the government gave approval for the state-owned and operated Polmin refinery to join the recently formed cartel of Polish oil refineries and distributors. This cartel, or syndicate, will control domestic sales on a pro rata basis, eliminate competitive marketing, fix prices and ear-mark for development operations and research work, a percentage of the increased profits resulting from these economies. It is expected that this so-called reserve fund will amount to between 3,000,000 and 5,000,000 zlotys (1 zloty equals 11¼ U. S. cents) per annum; and that a separate organization—in which all the member companies of the syndicate will have a participation—will handle the prospecting work and the exploitation of any new areas that are opened up.

To round out its legislation for improving the country's oil situation, the government has announced its intention of revising the existing organic law determining the legal right to dispose of sub-soil wealth, so far as petroleum is concerned. Under the old Austrian law still effective in Galicia, the owners of the surface of the land are likewise the owners of mineral wealth in the sub-soil; this conception being legally termed the "principle of accession."

### Decline in Production

The serious situation confronting the Polish oil industry is evidenced by the following figures on production, domestic consumption and exports:

**CRUDE PRODUCTION**

| District— | First 9 Months of— 1926 | 1927 | Increase or Decrease |
|---|---|---|---|
| | (Metric Tons) | | |
| Jaslo | 52,274 | 53,993 | + 1,719 |
| Drohobycz | 517,323 | 458,386 | —58,937 |
| Stanislawow | 35,868 | 30,535 | — 5,333 |
| Cracow | 108 | 9 | — 99 |
| Total | 605,573 | 542,923 | —62,650 |

**REFINERY OUTPUT**

| Product— | First 9 Months of— 1926 | 1927 | Decrease |
|---|---|---|---|
| | (Metric Tons) | | |
| Gasoline | 71,565 | 66,664 | 4,901 |
| Refined oil | 172,052 | 149,183 | 22,869 |
| Lubricating oils | 75,058 | 70,471 | 4,587 |
| Fuel oil | 117,951 | 87,486 | 30,465 |
| Paraffin wax | 29,912 | 27,465 | 2,447 |
| Greases | 68,802 | 52,625 | 16,177 |
| Total | 535,340 | 453,894 | 81,446 |

**DOMESTIC CONSUMPTION**

| Product— | First 9 Months of— 1926 | 1927 | Increase or Decrease |
|---|---|---|---|
| | (Metric Tons) | | |
| Gasoline | 23,339 | 36,057 | +12,718 |
| Refined oil | 83,701 | 95,155 | +11,454 |
| Lubricating oils | 46,624 | 47,222 | + 598 |
| Fuel oil | 16,991 | 32,348 | +15,357 |
| Paraffin wax | 5,226 | 8,741 | + 3,515 |
| Greases | 30,388 | 29,097 | — 1,291 |
| Total | 206,269 | 248,620 | +42,351 |

**EXPORTS**

| Product— | First 9 Months of— 1926 | 1927 | Increase or Decrease |
|---|---|---|---|
| | (Metric Tons) | | |
| Gasoline | 56,991 | 51,651 | — 5,340 |
| Refined oils | 82,848 | 34,192 | — 48,656 |
| Lubricating oils | 42,362 | 34,032 | — 8,330 |
| Fuel oils | 111,957 | 47,782 | — 64,175 |
| Paraffin wax | 23,365 | 14,919 | — 8,446 |
| Greases | 28,072 | 28,472 | + 400 |
| Total | 345,595 | 211,048 | —134,547 |

It is, therefore, reasonable to presume from the foregoing statistics, that, unless new sources of crude supply are opened up, Poland within two or three years at the limit will practically cease to be an oil-exporting country, especially as it must be assumed that domestic consumption will continue to increase.

## POTTAWATOMIE NOW SCENE OF ACTIVITY

(Continued from Page 38)

ders of two lines running southwest from the outside limits of the Greater Seminole group of pools, and following to some extent the general southwest trend which has marked the location of every pool of importance in this part of Oklahoma from Kiefer to Seminole. The south and southwest parts of the county seem to offer the localities believed most favorable to petroleum accumulation, and very probably the activity will be limited on the north by Township 10n.

The first oil well in Pottawatomie County was drilled in 1902 by the Rock Island Railroad on the Spencer farm in Section 34-10-2. It reached a depth of 2,000 feet after many soul-trying months, and was dry and abandoned. The next well was drilled by the Shaffer interests in 1904 in NW cor. NW of Section 8-10-4. It reached a depth of 2,900 feet and was abandoned. In 1912 a group of residents of the town of Maud formed a company called the Maud Oil & Gas Co. and drilled a well in Section 18-7-5. This well found a sand at 2,780 feet which produced 14 bbls. of oil daily, and this discovery gave impetus to the first lease play which the county experienced. The light well caused numerous oil companies to enter the county and take large blocks of wildcat leases. In later years, the wells of the Maud Oil & Gas Co. were deepened to the Hunton lime found at 3,800 feet and found production. This was the first pool of Hunton oil found in this area.

In addition to causing the taking up of large blocks of leases, the Maud shallow well started a rather extensive play of checkerboard acreage especially in the region between Ranges 2 and 5. The next well of importance on record was the test of the Prairie Oil & Gas Co. in the SW cor. SW of Section 28-10-2. An interesting feature of this test was that the Prairie leased the entire township in which this test was located, and held leases upon 23,040 acres. The Prairie well had a showing of dark, heavy oil at 2,800 feet and then was abandoned. The next important wildcat was drilled by the Atlantic Oil Producing Co. in NW SE Section 22-8-2. This well experienced an unusual amount of trouble and required two and one-half years to complete. It was abandoned at a depth of 3,300 feet, and was a very deep well for its time.

From that time on, the county witnessed a sporadic drilling work within its borders, and while some Hunton production was found, it was not until the Earlsboro Pool appeared that the production began to show up in good barrelage.

### Wilcox Sand Failures

There have been numerous Wilcox failures in the county. The well drilled by the McCulloch Oil Co. in Section 25-10-4 was one of the lowest structurally and found a hole full of water in the Wilcox sand at a depth of 4,987 feet.

The Roxana Petroleum Corp.'s test in Section 26-11-4 was another deep "flivver" and found water in the Wilcox at 5,560 feet. It is worthy of note that both of these wells are extremely low structurally, they both missing the Hunton lime, and neither showed any of the Hunton section on its log. When W. B. Pine drilled a test in Section 27-9-4, some samples of the Misener sand which were obtained, carried some reworked rocks which indicated the probable presence of a regional high around this locality. The Pine well found a show of oil at 4,560 feet, but found water in the Wilcox sand at 4,694 feet. The Amerada Petroleum Corp.'s test in Section 24-8-4 was another Wilcox sand failure which missed the Hunton section altogether. This well made some production from the Misener sand at 4,176 feet, and then found water in the Wilcox sand at 4,480 feet. The well drilled by the Mid-Kansas Oil & Gas Co. in Section 34-8-4 offered a contrast to these wells. It was also dry in the Wilcox, but it found a 120-foot section of Hunton lime. It made some oil on the swab from the Simpson sand, and then had a show of oil in the Wilcox, but not enough to make a well.

The Hunton acres of this region offer a study peculiar to the territory. According to many geologists of the territory, the success or failure of Hunton wells in this region depends more upon horizon conditions than it does upon structural conditions. The buried Hunton Hills of the territory present a topographic proposition solely, and the oil condition depends upon the workings of early streams which very often were likely to have established well-developed narrow valleys, although the interstream sections were practically undisturbed. Mainly on account of such workings of nature, there is small likelihood of any constant structural relations between the Hunton and the Wilcox, and the position of the latter is entirely problematical.

The Pearson Switch-St. Louis area now has 76 wells producing from the Hunton, and making a daily average production of 11,000 bbls. The first drilling in this field was done by the Independent Oil & Gas Co. and Darby Petroleum Co. in Section 15-7-4. Wells which later were deepened to the Wilcox horizon found almost 300 feet of Hunton section, and the Wilcox tests have all been dry to date.

Considering the activity which is shown on the accompanying map, it seems reasonable to believe that the drill will finally locate the Wilcox highs which have been so earnestly sought in this area. In the language of the old fields, "Pott County is hot."

## REFINERS CONSIDER RESEARCH WORK

(Continued from Page 37)

have had under consideration for some time the advisability of providing for a research program as one phase of the association's activities. It is believed that this work would be of great value to the membership without being a burdensome expense to any individual member. Some action relative to this matter will probably be taken at the Kansas City meeting.

Dr. Roy C. Cross, of the Kansas City Testing Laboratory, Kansas City, will lead the discussion of Doctor Whitmore's address. Doctor Cross, and his brother, Dr. Water Cross, are widely known in refinery circles as the inventors of the Cross cracking process and other processes of practical value to refinery operators.

The entertainment feature of the meeting will be a dinner on Tuesday evening at which the refiners will be guests of the Kansas City Realty Board. In addition to the association membership the realty board has invited a number of men prominent in the oil industry of the Southwest to attend the dinner.

## OKLAHOMA NATURAL GAS ENTERS KANSAS MARKET

The Kansas Public Service Commission last week issued an order approving a $14,000,000 bond issue by the Oklahoma Natural Gas Corp. for the purpose of purchasing oil and gas properties. Another order of the commission approved the sale by the Southern Kansas Gas Co. to the Oklahoma Natural, of its oil and gas properties, pipe lines, franchises and other properties in the cities of Chanute, Iola, Erie and Humboldt, Kans., and Anderson, Linn, Allen, Bourbon, Neosho, Wilson, Montgomery, Labette, Cherokee, Crawford and Woodson Counties.

A third order gave the Oklahoma Natural permission to engage as a public utility in the State of Kansas. A valuation of $5,500,000 was fixed on the Oklahoma Natural's properties in Kansas, $43,000,000 on Oklahoma and $1,500,000 on Texas holdings.

It is indicated that the Oklahoma Natural Gas Corp. will establish operating headquarters at Chanute, Kans.

## PRODUCTION ENGINEERING DIVISION TO VISIT BRADFORD FIELD IN MAY

By N. O. Fanning
*New York Bureau, The Oil and Gas Journal*

NEW YORK, Feb. 27.—At a meeting of the eastern district of the Division of Development and Production Engineering of the American Petroleum Institute held here, it was decided to hold a two-day session of the district organization at Bradford, Pa., about May 1. One day will be devoted to a field trip around the Bradford district, at which water flooding operations and other practical production methods will be studied, and the second day will be given over to the reading and discussion of specially prepared papers on production. The meeting will come to a close with a dinner for members at Bradford.

Frank M. Brewster, of the Petroleum Reclamation Co., Bradford, is sectional chairman for the eastern district. Other officers elected at the meeting were W. J. Brundred, Brundred Oil Corp., Oil City, Pa., vice chairman, and Forrest D Dorn, Forrest Oil Corp., Bradford, secretary.

It was voted at the meeting that Chairman Brewster appoint a committee on membership to embrace various sections of the eastern district, and later to appoint representatives on various subject committees.

William R. Boyd, Jr., assistant secretary and counsel of the American Petroleum Institute, made the following statement regarding the work and purposes of the production engineering division, which was read at the meeting:

"The Board of Directors of the Institute, during the last annual meeting, by resolution directed its executive officers 'to proceed to organize and conduct under their general management and supervision, a new departmental activity of the Institute to be known as the Division of Development and Production Engineering.'

"A special committee on Technical Relationships, appointed by the President, had recommended the creation of such a new activity and suggested the general outline of the type of its organization. Messrs. Clark, Welch and myself, approved this outline in principle and, without waiting to formulate any rules or plan of procedure, requested a meeting of interested Institute members at Chicago to elect for the first year a general chairman and general vice chairman. John R. Suman, of the Humble Oil & Refining Co., was elected general chairman and T. E. Swigart, of the Shell Co. of California, was elected general vice chairman. The executive officers designated C. A. Young, of the Institute's administrative staff, as executive secretary for the new division The meeting discussed generally the character of activity which should be conducted. This discussion was published in the proceedings of the annual meeting.

"On the following day the gentlemen to whom I have referred met with others interested and, with the approval of the executive officers, decided to proceed, without waiting for the formulation of rules of procedure for the new division. It was concluded to divide the country into five geographical sections, each having a sectional chairman, vice chairman and secretary, and that the chairman of each section, together with the general chairman, general vice chairman and executive secretary, should constitute the general committee for the new division.

"A sectional chairman for each of the five districts was appointed to serve for the first year. This was done in order that the general committee might be set up without delay and that each sectional chairman might get organized and under way the geographical section. Frank M. Brewster, of the Petroleum Reclamation Co., of Bradford, was appointed sectional chairman for the Eastern division, and you have met here today for the purpose of further extending the sectional organization and to discuss the kind and character of program which, in your judgment, the divisional and sectional organization should conduct.

"The resolution of the Board of Directors provides that any member of the Institute who is engaged or interested in the development and production of petroleum, who pays the special annual divisional membership dues may enroll as a member of the division. To date 370 members have enrolled. Of this number 125 reside in your eastern district.

"Technical engineering qualifications are not necessary to membership and it is specifically urged that field superintendents, foremen, etc., join the division and take part in its activities. The primary objective is the collection, correlation, discussion and dissemination of information of both a technical and practical nature concerning development and production technique. It is to be hoped that technical lines will not be too closely drawn and that the activity and future discussions will focus in substantial part upon problems that will have practical value and direct bearing upon the every day activities of the men engaged in finding and producing oil. By pursuing this course of action the division will, in my judgment, catch the imagination of every man concerned about producing oil, attract and hold his attention and enroll his active co-operation. The whole purpoe of this new department of Institute activity is to provide something that will prove of real service to the industry. It will serve in proportion to the constructive use that is made of it.

"The final plan of procedure has not yet been completed. A special committee composed of Max W. Ball, Wallace E. Pratt and Clark G. Gester are at work developing something to recommend for approval. The division will hold its first general meeting at Colorado Springs in June, the definite date to be announced later. In the meantime the district chairmen are going ahead with a skeletonized program of organization. Before you adjourn today obviously you should elect your sectional vice chairman and a sectional secretary and authorize the appointment of certain committees. It has been suggested that the final plan or program of procedure should provide that the general committee for the section or district be composed of the chairman, vice chairman, secretary and the chairman of each of the district committees that are formed. Carl Young is here and will be prepared to discuss and suggest the extent to which you should go today in organizing. Obviously the whole scheme of organization must be uniform for all the districts and action upon certain phases of your district organization will be deferred until the final plan of organization and procedure is determined. This will be done not later than the meeting at Colorado Springs.

"Yours is the first district meeting to be held. I congratulate you. What you do and say here today will be historical and will have, consciously or otherwise, some influence upon the plans for organizing other districts and possibly upon the general plan of procedure itself. It is hoped the discussions here today may be marked for their utmost frankness and that suggestions will be made and discussed that will have a profound influence upon the future activity of the division."

### FINISH PIPE LINE LOOP

HOUSTON, Tex., Feb. 27.—The Illinois Pipe Line Co. has announced the completion of its 8-inch loop line from the Yates Pool to its Del Rio tank farm together with 4 of the 10 stations to be built. When all stations are completed the line will have a capacity of 35,000 bbls. daily.

Illinois Pipe Line Co. also has completed more than 100 miles of its 10-inch line being laid from the Del Rio tank farm to Humble Pipe Line Co.'s Lytle station south of San Antonio, where connections are to be made, the Humble having contracted to take 20,000 bbls. daily.

## OKLAHOMA FUEL OIL PRICES ARE ADVANCED

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going direct to the trade at 5⅞ cents were general among purchasers, the amount moved at that price was undoubtedly small and 6 cents continues to represent the minimum in the price range for the bulk of the material moved. The average price as reported by representative refiners on this grade of gasoline is 6.168 cents for Monday's sales and differs but slightly from that of a week ago. The average price for the 60-62 437 endpoint grade is shown as 6.423 cents, while that for 60-62 400 endpoint gasoline is 6.705 cents. The 64-66 375 endpoint average price is shown as 7.170 cents. In general there is but little change.

### Natural Gasolines

The lesser demand and continued great volume of production in the Seminole Field has given the market weight but this condition is thought to be temporary and manufacturers are optimistic regarding the March outlook. The point to the movement of their product to the Gulf over January and the building up of stocks there as responsible for the falling off of that movement over February but conclude that these buyers will reenter the spot market soon after the first of March. In face of this expected increase in the export movement stands the increasing Seminole production, which at present exceeds 814,000 gallons daily as the net production, the increase amounting to approximately 30,000 gallons daily over the past two months. Opinions vary regarding the future importance of the Seminole Field as a producer of natural gasoline but past estimates of its production have been greatly exceeded and from a marketing standpoint, Seminole commands more serious attention than previously given it. The tremendous production will continue to contribute to holding prices near their present level for several months at least.

### Kerosenes and Distillates

Prices remained unchanged on kerosene and there was plenty of material available despite the removal of large quantities of it for export over the past month. Prices are expected to advance as the spring season is entered and the demand is made for tractor fuels. The 41-43 grade was generally traded at 4⅛ cents but some went for export at 4 cents. A number of refiners say they are getting 4¼ cents for their production and have held stocks at a low level.

Distillates moved even slower than during the past two weeks when the market was decidedly weak. Some price concessions were offered on the high flash grades. The distillate season is fast coming to a close and stocks have been reduced to a minimum. Over the balance of the season the demand will probably be very irregular, depending upon the weather.

### Gas Oil and Fuel Oil

Gas oil was more actively traded and the stability of the gasoline market together with the better fuel prices makes gas oil more desirable as a cracking stock. While these factors tend to strengthen its position it was still available at 2½ cents, the same as last week's price.

### Lubricants and Wax

No change occurred in the general price structure on refinery lubricants as a result of the crude price adjustments and refiners do not anticipate a change until the demand is increased. Cylinder stocks, including bright stocks, are weak and while this condition has prevailed for several weeks, conditions certainly are no better. Export orders are taking the excess production which goes at price concessions and in that way the spot market is supported. Bright stocks are finding stronger competition as outside refiners offer material in the Oklahoma market where prices are said to be cut already to a minimum.

Wax has shown added strength and is being quoted at 3 cents by most refiners with an effort being made to boost the price still higher. The demand has increased sufficiently to support the 3-cent market and the future of the wax market is being viewed with optimism.

## CALIFORNIA OIL FIELD OPERATIONS FOR JANUARY, 1928

According to figures collected by the American Petroleum Institute, Pacific Coast office, the total production of crude oil in California for January amounts to 19,028,228 bbls., an average of 613,814 bbls. per day. This is an increase of 2,884 bbls. per day over December production.

Total stocks of crude and all products in Pacific Coast territory increased during the month 1,057,439 bbls. The total stocks at the end of the month were 140,397,789 bbls. Comparative figures as of January 31, 1928, December 31, 1927, and January 31, 1927, are shown in detail on the second page of this report.

Forty-three wells were completed during the month with an initial daily production of 18,410 bbls., compared with 58 wells completed during December with an initial production of 19,358 bbls.

### PRODUCTION

(Figures of production and stocks are in barrels of 42 gallons)

| District— | B bls. Per Month | Daily Average Jan., 1928 | Dec., 1927 | Jan., 1927 |
|---|---|---|---|---|
| Kern River | 777,448 | 25,079 | 23,268 | 13,236 |
| Mount Poso | 2,929 | 94 | 111 | 225 |
| Round Mountain | 1,195 | 39 | ..... | ..... |
| McKittrick | 148,361 | 4,786 | 4,932 | 5,290 |
| Midway-Sunset | 2,471,365 | 79,721 | 80,883 | 90,477 |
| Elk Hills | 745,635 | 24,053 | 23,955 | 34,325 |
| Lost Hills-Belridge | 128,873 | 4,157 | 4,153 | 4,819 |
| Coalinga | 606,612 | 19,568 | 18,768 | 18,896 |
| Wheeler Ridge | 28,958 | 934 | 989 | 1,053 |
| Watsonville | 1,783 | 58 | 58 | 56 |
| Santa Maria | 190,560 | 6,147 | 5,872 | 4,641 |
| Summerland | 3,885 | 125 | 125 | 137 |
| Goleta | 9,363 | 302 | 231 | ..... |
| Rincon (Seacliff) | 13,556 | 437 | 157 | ..... |
| Ventura Avenue | 1,617,350 | 52,173 | 51,121 | 53,693 |
| Ventura-Newhall | 195,531 | 6,307 | 5,950 | 5,507 |
| Los Angeles-Salt Lake | 46,943 | 1,518 | 1,613 | 1,736 |
| Whittier | 51,577 | 1,664 | 1,730 | 1,967 |
| Fullerton (Brea Olinda) | 465,500 | 15,016 | 14,969 | 25,213 |
| Coyote | 432,751 | 13,960 | 13,870 | 15,326 |
| Santa Fe Springs | 1,200,632 | 38,730 | 38,807 | 44,692 |
| Montebello | 395,946 | 12,772 | 12,947 | 17,492 |
| Richfield | 655,299 | 21,139 | 21,629 | 20,354 |
| Huntington Beach | 1,817,363 | 58,625 | 59,807 | 92,254 |
| Long Beach | 3,505,390 | 113,077 | 108,397 | 92,564 |
| Torrance | 610,527 | 19,694 | 20,361 | 25,783 |
| Dominguez | 401,629 | 12,956 | 13,612 | 18,461 |
| Rosecrans | 246,304 | 7,913 | 8,521 | 11,970 |
| Inglewood | 967,665 | 31,213 | 31,566 | 39,560 |
| Newport | 460 | 15 | 15 | 32 |
| Seal Beach | 1,287,898 | 41,545 | 42,514 | 10,094 |
| Total | 19,028,228 | 613,814 | 610,930 | 651,125 |
| December, 1927 | 18,938,823 | 610,930 | ..... | ..... |
| Increase | 89,405 | 2,884 | ..... | ..... |

### STOCKS

| | Jan. 31, 1928 | †Dec. 31, 1927 | Jan. Stock Increases | †Jan. 31, 1927 |
|---|---|---|---|---|
| Heavy crude, heavier than 20 degrees A.P.I. Including all grades of fuel | 95,621,539 | 94,907,147 | 714,392 | 90,462,728 |
| Refinable crude, 20 degrees A.P.I., and lighter | 20,784,053 | 20,268,569 | 515,484 | 31,176,493 |
| Gasoline | 12,919,356 | 12,733,763 | 185,593 | 13,503,134 |
| Naphtha distillates | 1,820,900 | 1,901,279 | *80,379 | 4,114,777 |
| All other stocks | 9,251,941 | 9,529,592 | *277,651 | 10,423,669 |
| Total all stocks | 140,397,789 | 139,340,350 | 1,057,439 | 149,680,801 |

*Decrease. †Revised.

Due to correction in the stock figures previously reported by one of the larger companies, revised stock figures for Pacific Coast territory for the period December 31, 1926 to December 31, 1927, are shown below:

| | Heavy Crude and Fuel | Refinable Crude | Gasoline | Naphtha Distillates | All Other Stocks | Total |
|---|---|---|---|---|---|---|
| 1926— | | | | | | |
| December 31 | 89,746,623 | 30,835,057 | 11,808,872 | 3,963,359 | 10,580,645 | 146,934,556 |
| 1927— | | | | | | |
| January 31 | 90,462,728 | 31,176,493 | 13,503,134 | 4,114,577 | 10,423,669 | 149,680,801 |
| February 28 | 90,301,202 | 29,913,353 | 14,017,263 | 4,033,824 | 10,495,741 | 148,761,383 |
| March 31 | 90,232,297 | 29,500,917 | 14,571,992 | 4,058,974 | 10,003,875 | 148,368,055 |
| April 30 | 90,820,675 | 29,418,335 | 14,718,706 | 3,741,718 | 9,907,191 | 148,606,625 |
| May 31 | 92,812,985 | 27,365,926 | 13,752,436 | 3,659,951 | 9,924,425 | 147,515,723 |
| June 30 | 93,326,393 | 27,175,071 | 13,578,582 | 3,517,038 | 9,716,166 | 147,313,050 |
| July 31 | 94,390,140 | 25,639,883 | 12,883,181 | 3,413,614 | 9,943,525 | 146,270,343 |
| August 31 | 94,589,976 | 22,931,170 | 12,423,877 | 3,104,755 | 9,444,877 | 143,494,655 |
| September 30 | 95,006,723 | 23,025,124 | 12,365,729 | 2,672,994 | 9,860,777 | 142,931,347 |
| October 31 | 94,984,154 | 21,841,747 | 12,693,027 | 2,351,849 | 9,860,235 | 141,731,012 |
| November 30 | 95,212,430 | 21,371,274 | 12,820,738 | 2,039,755 | 9,745,428 | 141,189,625 |
| December 31 | 94,907,147 | 20,268,569 | 12,733,763 | 1,901,279 | 9,529,592 | 139,340,350 |

### DEVELOPMENT

| | New Rigs Up | Active Drilling | Completed | Daily Initial Output | Active Producing | Aban. Wells Drillers | Aban. Wells Producers |
|---|---|---|---|---|---|---|---|
| Kern River | 20 | 20 | 14 | 2,255 | 1,379 | .. | .. |
| Mount Poso | .. | 1 | .. | ..... | 3 | .. | .. |
| Round Mountain | 3 | 7 | 2 | 626 | 1 | .. | .. |
| McKittrick | 1 | 1 | .. | ..... | 302 | .. | .. |
| Midway-Sunset | 2 | 7 | 6 | 574 | 2,853 | 1 | 3 |
| Elk Hills | .. | .. | .. | ..... | 225 | .. | .. |
| Lost Hills-Belridge | 3 | 1 | .. | ..... | 309 | 1 | .. |
| Coalinga | .. | 2 | 1 | 43 | 992 | .. | .. |
| Wheeler Ridge | .. | 1 | 1 | 70 | 31 | .. | .. |
| Watsonville | .. | .. | .. | ..... | 6 | .. | .. |
| Santa Maria | .. | 4 | 2 | 640 | 228 | .. | .. |
| Summerland | .. | 1 | .. | ..... | 91 | .. | .. |
| Goleta | .. | 1 | .. | ..... | 6 | 3 | 2 |
| Rincon (Seacliff) | 9 | 20 | 3 | 775 | 4 | .. | .. |
| Ventura Avenue | 6 | 30 | 1 | 1,872 | 109 | .. | .. |
| Ventura-Newhall | .. | 24 | .. | ..... | 504 | .. | .. |
| Los Angeles-Salt Lake | .. | .. | .. | ..... | 334 | .. | .. |
| Whittier | .. | .. | .. | ..... | 183 | .. | .. |
| Fullerton (Brea Olinda) | .. | 6 | .. | ..... | 381 | .. | .. |
| Coyote | .. | 2 | .. | ..... | 208 | .. | 3 |
| Santa Fe Springs | .. | 1 | 1 | 65 | 316 | .. | .. |
| Montebello | 1 | 3 | 1 | 50 | 175 | .. | .. |
| Richfield | .. | 9 | 4 | 605 | 258 | .. | 1 |
| Huntington Beach | 3 | 17 | .. | ..... | 571 | 2 | 7 |
| Long Beach | 42 | 137 | 5 | 10,564 | 619 | .. | 14 |
| Torrance | .. | .. | 1 | 95 | 650 | .. | 2 |
| Dominguez | 1 | 2 | 1 | 182 | 70 | .. | 1 |
| Rosecrans | .. | 2 | .. | ..... | 109 | .. | 4 |
| Inglewood | 3 | 3 | .. | ..... | 224 | .. | .. |
| Newport | .. | 1 | .. | ..... | 8 | 1 | .. |
| Seal Beach | .. | 4 | .. | ..... | 136 | 4 | .. |
| Potrero | 1 | 2 | .. | ..... | ..... | .. | .. |
| Miscellaneous drilling | 18 | 137 | .. | ..... | ..... | 8 | .. |
| January, 1928 | 113 | 446 | 43 | 18,410 | 11,281 | 21 | 37 |
| December, 1927 | 96 | 401 | 58 | 19,358 | 11,284 | 12 | 23 |
| Increase | 17 | 45 | *15 | *948 | *3 | 9 | 14 |
| Average for year 1927 | 97 | 404 | 75 | 39,992 | 11,276 | 23 | 21 |
| Average for year 1926 | 95 | 422 | 76 | 32,635 | 11,288 | 24 | 17 |
| Average for year 1925 | 105 | 417 | 75 | 42,247 | 11,393 | 28 | 12 |
| Average for year 1924 | 103 | 510 | 103 | 42,412 | 10,903 | 28 | 21 |
| Average for year 1923 | 111 | 759 | 82 | 114,690 | 8,928 | 24 | .. |

## Late Fields

(Continued from Page 48)

operation in this region, and it was started by permission of the umpire and the advisory committee, when the lease owners were unable to renew their lease, and were forced to drill.

The Reed well had the top of the Hunton lime at 4,510 feet, and drilled only 10 feet of Hunton, passing into the Sylvan shale at 4,520 feet, and it is now reported drilling in Sylvan at 4,560 feet. According to the usual experiences, when the Hunton is present, a full section of Sylvan shale must be anticipated, and since the maximum thickness of Sylvan section has been 110 feet, it is probable that some 80 feet of Sylvan will be encountered. This leaves the possibility of finding the top of the sand around 4,650 feet, allowing for a probable 40 feet of Viola, and 10 feet of Simpson sand.

While the Reed well appears to be running extremely low, it should be remembered that one well at Earlsboro found the Wilcox sand 400 feet low, and was a good producer. This is the exception rather than the rule. If the Reed well is a failure, it will throw a damper upon the Maud area, as it is only one-half mile east and one location north of the Barnsdall Oil Co.'s No. 1 Fife, which started the Wilcox sand excitement in this area.

In Osage County a peculiar situation has been created by the Kay County Gas Co. on the Naval Reserve, where that concern owns the gas rights. Under the Osage tribal laws, the gas and oil rights are separate propositions, and gas and oil lessees must give each other recognition. The Kay County Gas Co. (Marland Oil Co. subsidiary) owns the gas lease upon the Naval Reserve and the oil rights have never been leased. The company drilled two wells, and has two oil wells, and it is probable that the leases affected by this discovery must be offered at public auction. According to one opinion which was advanced, the gas company may continue to produce the oil, and after paying the usual royalty, may keep the remainder, and continue production until such time as the lease is sold. Others believe that the wells must be shut in completely until the sale.

The two wells which caused this are No. 2, NE cor. NE SW, Section 22-24-7, which appears good for 800 bbls. daily from a sand which is either the Wilcox or the Siliceous lime found 2,834-99 feet. It is thought that the last 10 feet drilled resembled siliceous lime. The other well is No. 1, SE cor. SW SE, Section 9-23-7, 4½ miles south of the first well. It had sand 2,944-61 feet, and is estimated at 300 bbls. Both of these wells are now shut in and waiting some decision about lease obligations.

In the Pearson Switch Pool of Pottawatomie County, the Indian Territory Illuminating Oil Co.'s No. 1 Sullivan, SW cor. NW SE, Section 25-7-3, is again flowing 1,059 bbls., and is cutting 6 per cent, an increase of 1 per cent in the cut which it was making the first part of the week.

McCulloch Oil Co.'s No. 1 Villines, SE cor. SW SW, Section 18-7-4, found the Hunton lime 3,820-40 feet, and made two small flows. It is estimated at 100 bbls. on the pump, and extends the Hunton production half a mile.

## MEXICAN PERMITS

MEXICO CITY, Mexico, Feb. 24 (By Trens Agency).—During the month of January the Bureau of Petroleum of the Department of Industry, Commerce and Labor issued 46 drilling permits. During the first three weeks of February, 38 permits were granted to the various companies. Drilling permits recently granted are: La Corona—Cacalilao 202 and 203, Cacalilao, Panuco, Veracruz. El Sol—Wells 8, 9, 13 and 14, left bank of the Panuco River, Veracruz. El Aguila—Cerro Viejo 56, 57, 58 and 59, Cerro Viejo, Temapache, Veracruz; Furbero 46, 47, 48, 49 and 50, Furbero, Cotzintla, Veracruz; Filisola 113, 117 and 118, Filisola, Minatitlan, Veracruz.

## RULING IN ARKANSAS FRANCHISE TAX LEVY

SHREVEPORT, La., Feb. 25.—A decision of far-reaching importance and having particular bearing upon all oil companies operating in Arkansas in either or all phases of the industry was rendered in the Arkansas Supreme Court when Justice Kirby as the organ of the court ruled that the Arkansas franchise tax may be levied upon foreign corporations doing business in the State only up to the amount of their subscribed capital stock as represented by property owned and used in business transacted within the State. Formerly the tax was based on these two factors and the taxed corporations' capital.

The decision was rendered in the case of Koonce, state treasurer, versus Pierce Petroleum Corp. The treasurer had sought to collect a franchise tax of $3,-362. The company refused to pay this amount and tendered $557 as the amount of tax it was legally liable for. The tender was refused and the case taken to court where a temporary injunction restraining the collection of the larger amount was granted the company, and later made permanent. Koonce appealed and the decision was rendered in denying his appeal.

Outlining the case and condensing the opinion the syllabus of the court's ruling states:

"Foreign Corporations—Franchise Tax. Crawford & Moses' Digest, paragraph, as amended by Act 271 of 1925, is plain and unambiguous, and being in conflict with and repugnant to the provisions of said section as amended by Act 236 of 1925, necessarily repeals said Act 236, and therefore the tax department of the State is without authority to charge a franchise tax upon the capital stock of a foreign corporation, as represented by property owned and business transacted in this State, and is only authorized to charge the same upon the proportion of the subscribed capital stock of the corporation represented by property owned and used in business transacted in the State.

## NEW LAW IN COLOMBIA MAY BLOCK OPERATIONS

WASHINGTON, D. C., Feb. 27.—American companies interested in Colombian oil lands informed the State Department they intend to contest the Colombian decree effective March 5, promulgating regulations in connection with the oil law of 1927.

Allan W. Dulles, representing the Carib syndicate and the South American Gulf Oil Co., said the oil companies have determined to appeal to the Colombian Council of State to have the decree suspended as unconstitutional as it involves new action which could be taken only by the Colombian congress. Should the appeal fail, the companies plan to file suit in the supreme court of Colombia. Legal action probably would involve stoppage of all work being done by the American companies.

### ASK BIDS ON LEASES

The commissioners of the Land Office of the State of Oklahoma will receive sealed bids until 2 o'clock p.m. on February 28, 1928, for oil and gas leases on school and State lands as follows: Lincoln County—NW Section 16-13n-4e. Pottawatomie County—E half SE Section 16-9n-4e; SW Section 16-9n-4e.

The commissioners will receive sealed bids until 2 o'clock p.m. on March 6, 1928, as follows: Pawnee County—Lots 3 and 4 of NE Section 16-21n-7e, 49.40 acres; Lot 6 of NW Section 16-21n-7e, 36-10 acres. Pottawatomie County—E half NW Section 16-11n-6e; E half SW Section 16-11n-6e.

The commissioners will receive sealed bids until 2 o'clock p.m. on March 13, 1928, as follows: Garfield County—SW Section 13-21n-4w.

The commissioners will receive sealed bids until 2 o'clock p.m. on March 20, 1928, as follows: Kay County—NE Section 36-27n-3e; SE Section 36-27n-3e; SW Section 36-27n-3e.

## PRODUCTION RECORD BY COMPANIES OPERATING IN THE MEXICAN FIELDS

MEXICO CITY, Mexico, Feb. 18.—(By Trens Agency)—Failure to drill, rather than any exhaustion of deposits according to Mexican figures, accounts for the decrease in production in that country in 1927 compared with the previous year. The ratio between the wells completed and producers remain practically the same as in previous years.

The work done in 1927 brought about several important changes in the relative status of the companies. Principal among these was the leap to the front of the Penn Mex Fuel Co. as a producer of light crude, ousting the Huasteca Petroleum Co. from a position which it had held for more than 10 years.

The Penn Mex had eight successful completions, for a total production of 48,500 bbls. a day. Of this number, five were in the Paso Real tract, an extension of the Alamo Pool. This tract is virgin territory and is controlled in its entirety by the Penn Mex. The company will take from this tract during 1928 not less than 35,000 bbls. a day.

Both El Aguila, pioneer in the Isthmus of Tehauntepec region, and the International continued development in this region as well as in other fields.

The Pan-American, with its numerous subsidiaries, continued to lead the field in the number of wells successfully completed and in new production. It drilled 175 wells to completion in 1927 as compared with 195 during the previous year.

The number of wells in 1927 which went to gas or were abandoned for other reasons amounted to 11, compared with 19 in the previous year. The number of salt wells was 86 against 132 in 1926 and the number of dry holes was 247 compared with 301 in the previous year.

The comparative figures on wells completed, producers and initial flow in 1926 and 1927 are as follows:

| Company— | 1927 Wells Completed | 1927 Producers | 1927 Initial Flow | 1926 Wells Completed | 1926 Producers | 1926 Initial Flow |
|---|---|---|---|---|---|---|
| Pan American | 175 | 66 | 155,980 | 195 | 73 | 759,745 |
| National RRs | 39 | 10 | 48,680 | 45 | 8 | 36,000 |
| Corona | 26 | 8 | 3,250 | 61 | 24 | 17,000 |
| East Coast | 5 | 4 | 656 | 24 | 17 | 13,250 |
| Empire | 76 | 27 | 27,000 | 23 | 8 | 5,000 |
| Marland | 24 | 5 | 2,075 | 36 | 14 | 8,140 |
| International | 29 | 7 | 6,000 | 58 | 12 | 10,985 |
| Aguila | 25 | 6 | 12,650 | 38 | 17 | 52,150 |
| Gulf Oil Corp. | 17 | 5 | 5,070 | 63 | 24 | 55,550 |
| Sinclair | 5 | 1 | 5,000 | 39 | 13 | 7,500 |
| Penn Mex Fuel | 8 | 5 | 48,500 | 1 | 0 | ..... |
| The Texas Company | 5 | 4 | 475 | 4 | 1 | 100 |
| Transcontinental | 16 | 4 | 300 | 84 | 23 | 35,450 |
| Miscellaneous | 102 | 25 | 15,750 | 138 | 56 | 81,685 |
| Totals | 552 | 177 | 331,380 | 803 | 290 | 1,102,535 |

The figures which are given for the Empire are for wells which were drilled by the Sinclair on lands which it has operated for the Empire for several years. Figures on El Aguila and International do not include their operations on the Isthmus of Tehuantepec.

## TRANSCONTINENTAL PIPE LINE OUTLINED IN SUIT

FORT WORTH, Tex., Feb. 20.—The suit filed by the Transcontinental Oil Co. in Forty-eighth District Court to restrain the Mid-Kansas Oil & Gas Co. from denying the Transcontinental's asserted right to handle and market its half of oil produced from leases jointly owned in the Yates Pool brings to light plans by the Transcontinental to spend $10,000,000 in development purposes, including a pipe line to a port on the Gulf with a tank farm and refinery at this port.

The proposed pipe line would have a daily run of 30,000 bbls., according to the petition. At present, the suit states, the Transcontinental and Mid-Kansas joint production is 14,400 bbls. a day, but only 30 per cent of the total production is handled by the only two pipe line out of the field.

These two pipe lines, claimed to be controlled by one company in fact, or two companies which are one in essence, have a daily capacity of only 48,000 bbls., the petition states. The daily potential production of the Yates Field or Pool is stated to be at least 500,000 bbls. The petition recites further that it is necessary that the new pipe line be built to develop competition in the field and in the marketing of its production.

According to the petition, the Transcontinental and Mid-Kansas own in equal interests leases on extensive oil lands in the Yates Pool. The holdings listed both by acres and by sections are understood to amount to about 11,000 acres.

The Transcontinental contends in the suit that the Mid-Kansas is claiming the right, by interpretation of the contract between them, to market and handle all the production from their joint leases. The asserted right is denied by the Transcontinental.

### TO FINANCE GAS EXTENSIONS

CHATHAM, Ontario, Feb. 25. — The Volcanic Oil & Gas Co. is making an offering to its shareholders of treasury shares to the extent of one-tenth of their holdings. The offer is open to shareholders of record April 2, subscription rights expiring May 1. The money will be used for the needs of the Volcanic company's subsidiary, the Union Natural Gas Co. of Canada, to finance further development of marketing systems recently acquired at Windsor, Chatham and Wallaceburg, Ontario.

### PAGE GAS INTERESTS SOLD

Sale of the Charles Page light and gas utilities to the Oklahoma Power & Water Co. for a consideration of $8,000,000 and complete reorganization under the management of the new corporation has been announced. The sale includes the Sand Springs Gas Co., the Sand Springs absorption plant and the Bruner gasoline plant.

### J. J. McGRAW IMPROVED

J. J. McGraw, president of the Exchange National Bank of Tulsa, who has been seriously ill at Hot Springs, Ark., was reported Tuesday night of this week as showing improvement. Henry McGraw, vice president of the Gypsy Oil Co. and brother of the banker, was at the bedside of Mr. McGraw and stated Tuesday night the turn for the better had seemingly removed the necessity of an operation which previously had been considered.

### BIG KANSAS GASSER

McPHERSON, Kans., Feb. 28.—The McPherson Oil & Gas Development Co.'s No. 1 C. O. Anderson, Section 31-18-2w, 9 miles northwest of here, struck the big gas bearing sand at 2,915 feet today and began flowing at the rate of 17,000,000 feet daily.

### OSAGE OIL RESTRICTION

WASHINGTON, D. C., Feb. 25.—The Senate passed the Frazier bill authorizing the Secretary of Interior to restrict production of oil on Osage Indian lands. The bill would allow the secretary to reduce the area offered annually or suspend offers of leases for two years whenever in his opinion there is an overproduction of oil or inadequate prices. The bill now goes to the House.

## SEMINOLE OPERATORS COMMENDED IN ACTION

In a resolution adopted by the executive committee of the Kansas-Oklahoma Division of the Mid-Continent Oil & Gas Association it commends to the oil producers of the United States "the splendid example of orderly production, with the resultant conservation, furnished by the recent history of the operations of what is known as the Seminole area in Oklahoma.

"The idea of conservation of natural resources is uppermost in the minds of the consumers as well as the producers of petroleum, and this association believes that the orderly manner in which the operations have been carried on in the Seminole area during the past six months and its potential production conserved will have the beneficial effect of demonstrating the industry's inherent ability to eliminate many of its troubles through co-operation.

"Secondly; this association believes that the recent example set by the Seminole operators should be adopted and followed in the development and production of other areas wherever a new pool is opened in the United States. This will have the twofold result of eliminating economic waste and bringing about a more orderly production and marketing of petroleum products, all to the ultimate benefit both of the producer and the consumer.

"We, therefore, urge that in every producing region in the Mid-Continent Field the producers devise and follow an effective method of co-operative development and operation, to the end that vast quantities of oil for which the world has no present use be not brought to the surface entailing the enormous loss both upon the producers and upon the public which must unavoidably be incurred through surface storage."

## PICKED BAYONNE SITE; SAYS JOHN D. GREATEST

John E. Andrus, Yonkers capitalist, felt so well that in his annual interview, this time on the eve of his eighty-seventh birthday, he offered to engage in a boxing bout with his interviewer from the New York Times.

Mr. Andrus went on: "I expect to live long. I hope to live to within a few days of the age of Methuselah."

Asked to name the greatest man he knew, he replied: "Well, I should say John D. Rockefeller. If this republic lasts a thousand years it will not produce a man his equal."

Mr. Andrus revealed that he had large interests in Standard Oil and he told how he had foreseen that the New Jersey meadows near Bayonne would provide a good site for oil refineries. He said he had had the land surveyed and then informed the Standard Oil what a good purchase it would be.

"They went to work and bought it," he said. "Then they wouldn't give me a cent. Well, I went to President Bostwick of Standard Oil. I told him this was hardly fair. Bostwick told me I was not a licensed broker and the company would not pay me a commission. But I think he wanted to do something for me. He seemed to have a heart.

"Finally he told me they would let me have some shares on credit. I was to pay 6 per cent interest as if it were a loan and let the dividends pay for the stock. I owned it outright in a short time and, oh, how those shares have grown!"

He predicted a continuance of prosperity and advised savings as a means of protection for old age.

Mr. Andrus has relinquished the title of the "richest straphanger," as he now rides to work in an automobile instead of the subway. He spent his birthday at his chemical factory in Yonkers.

### G. B. FLEMING DIES

George B. Fleming, 66 years old and a veteran employe of the Prairie Oil & Gas Co. stationed at Kiefer, died Saturday night at his home following an illness of eight months.

## NEW SEMINOLE PLAN IS GAINING IN FAVOR

(Continued from Page 40)

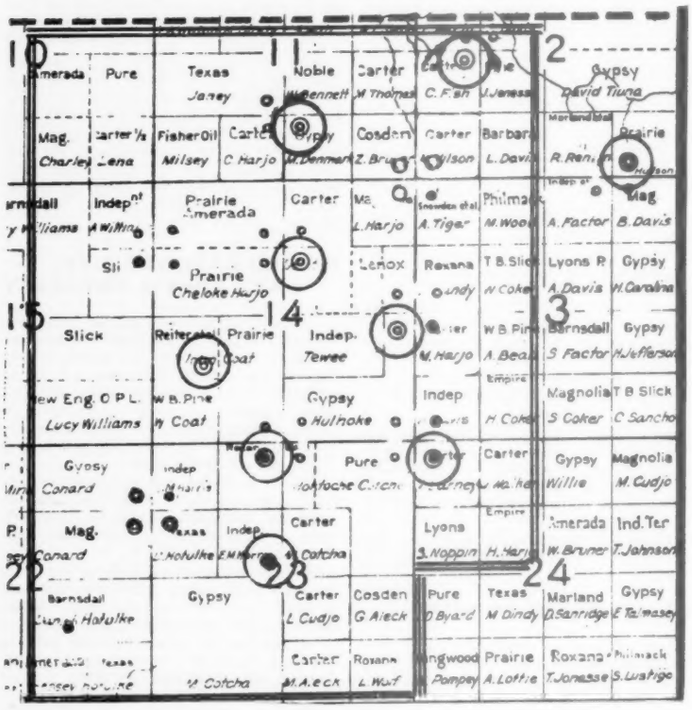
hereto and made part hereof, as Schedule 'A,' agree between and among themse ves as follows:

"The Independent Oil & Gas Co. and Snowden and his associates have each drilled a producing well in such area; the Independent well being located in the northwest quarter (NW4) of the northwest quarter (NW4) of Section 23, Township 7 north, Range 6 east, and the Snowden well being located in the northwest quarter (NW4) of the northwest quarter (NW4) of Section 13, Township 7 north, Range 6 east. All offset locations to these two producing wells may be drilled at once. The Independent company may produce its said well to full capacity until a producing offset is completed thereto and Snowden and associates may produce their said well to full capacity until a producing offset is completed thereto. Upon the completion of a producing offset, as permitted herein, the production of the original well and the production of the offset thereto shall be reduced to fifty (50) barrels per well per day for the period and subject to the conditions set forth in paragraph two hereof.

"As soon as may be nine wells may be drilled and completed in said area at the locations and by the parties indicated upon Schedule 'A'; such wells to be drilled to a depth sufficient to test the sand from which production is now being obtained from the two producing wells described in paragraph one hereof. No wells other than those specified in paragraphs one and two hereof shall be commenced in said area before seventy-five (75) days from March 1, 1928. After the expiration of such seventy-five (75) day period, any lessee interested in said area may commence such additional wells therein as he may desire and when the first of the wells last provided for herein shall be completed as a producer, all wells in the area shown by Schedule 'A' may be produced to their full capacity. Until the happening of the contingency last mentioned herein, none of the wells in said area shall be permitted to produce more than fifty (50) barrels per day. Provided, however, that the two producing wells described in paragraph one hereof may produce to full capacity until a producing offset thereto is completed as stipulated in paragraph one hereof.

"This agreement shall be effective as of March 1, 1928, and shall operate to terminate any agreement heretofore made, or any order of the Corporation Commission hertofore entered into with reference to the development of the area described in Schedule 'A,' upon and subject to execution hereof by all parties above referred to.

"This agreement shall extend to and bind the respective heirs, executors, administrators, successors and assigns of the parties hereto and shall constitute a covenant running with the lands described in said area."




*The area south of the Little River Pool in the Greater Seminole region. The wells marked with a triple circle show test locations, which may be started March 1. The wells marked with a double circle are offsets to producing wells, which may also be started March 1. Wells marked with a single circle are secondary locations which may not be started until 75 days after March 1.*

## VACUUM TO ENTER GASOLINE MARKETING

(Continued from Page 216)

Transit Co. as of December 31, 1927, follows:

Assets: Plant, $6,181,967; U. S. Government bonds, $777,177; railroad and municipal bonds, $1,974,494; cash, $115,673; accounts receivable, $85,553; other assets, $28,297; total, $9,163,161.

Liabilities: Capital stock, $5,000,000; accounts payable, $87,077; tax reserve, $5,908; reserve for fire insurance, and annuities and death benefits, $494,809; reserve for accrued depreciation, $2,301,228; surplus, $1,274,139; total, $9,163,161.

### American Republics

Craig F. Cullinan has been elected president of the American Republics Corp., succeeding Joseph S. Cullinan, resigned. J. H. Durbin, formerly vice president and treasurer, Frank Cullinan, J. R. Miglietta and E. G. Floeter were made vice presidents. H. C. McCarthy was elected secretary, and C. S. Derham, treasurer, succeeding Mr. Durbin. Joseph S. Cullinan has been elected chairman of the stockholders' advisory committee. E. G. Floeter of Houston, Tex., was elected a director to succeed H. C. McCarthy. Other directors were re-elected.

## OSBORN RESIGNS FROM MARLAND OIL COMPANY

Campbell Osborn, for eight years head of the department of economics of the Marland Oil Co., has resigned, effective April 1. Better opportunities for service and profit in the professional field were given by Mr. Osborn as the reason for his resignation. He plans to practice law in Tulsa and Washington, D. C., specializing in oil litigation and matters before the departments and courts of the capital city

Campbell Osborn

and in consulting work in petroleum engineering, with particular reference to supply, demand, price, investments, valuations and costs.

Prior to his association with the Marland Oil Co., Mr. Osborn was connected with the United States Geological Survey, where in 1917 he organized the monthly government economic service for the petroleum industry. In 1920 he was asked by the Marland Oil Co. to come to Ponca City, where he made a detailed study of the petroleum industry, and since then, as head of the department of economics, has taken an important part in many of the company's policies.

## MARKET CONTINUES FIRM IN SHREVEPORT SECTION

SHREVEPORT, La., Feb. 27.—The firm undertone to the refined oil market in this territory noted last week remains and if anything is a little stronger. Refiners here and in El Dorado are more optimistic, especially those in El Dorado who are anticipating a slight increase in gasoline. All refiners in this territory find themselves in good shape with the opening of the first month of spring with one or two of them behind with their orders and prospects for all of them being for still heavier bookings.

One refiner was of the opinion that the situation justifies posting an increase but he is holding off for a while to see what happens in North Texas and Oklahoma. Present prices on this product are 6¼ to 6⅝ cents. Gas oil is a little weak at 3 cents to 3¼ cents; kerosene, 4¾ cents to 5 cents, and fuel oil 97½ cents to $1 at Shreveport and 95 cents at El Dorado.

### OPERATING JOLIET PLANT

CHICAGO, Feb. 25.—The refinery located at Joliet, Ill., is now owned and is being operated by the Henry H. Cross Co., of Chicago. George F. Fox, vice president of the Cross Company, is the general manager and M. L. Berryman, the plant superintendent. The present daily crude capacity is 2,500 bbls. The plant is being operated as a skimming plant and is producing gasoline, keosene, gas oil and fuel oil, these products being sold through the Henry H. Cross Co.

## EXPLOSION CAUSES FIRE AT SHREVEPORT REFINERY

SHREVEPORT, La., Feb. 27.—An explosion of vapor in an empty gasoline storage tank caused when a negro dropped an electric light globe while cleaning the tank started a fire in the Louisiana Oil Refining Corp.'s Gas Center plant here Saturday night. The fire will cause a partial shut down of the plant for two weeks and a loss that will range between $50,000 and $100,000, possibly more.

The explosion set fire to waste oil within the plant enclosure and this in turn spread across the moat of a 35,000-bbl. crude oil tank with a wooden roof in which there were several feet of oil. It boiled over in a few hours in spite of foam protection at the plant and foam generating equipment of the Shreveport Fire Department brought to work against the flames.

Burning oil ran down ditches on both sides the road skirting the plant, all but trapped a group of firemen and others, and destroyed a fire department truck and another automobile. The negroes sent to clean out the tank were blown through the manhole but were not injured.

Company officials had not finished an inventory of the damage Monday but said the greatest loss would be in material destroyed, crude and refined oil, and some of the plant equipment. No damage was done to stills. The equipment destroyed included a 40,000-bbl. crude oil tank, six small run down tanks, two 2,500-bbl. gasoline tanks, one agitator and one separator. Production of refined products will be curtailed slightly but the plant will not be shut down entirely, it was stated.

## MANY GEOLOGISTS PLAN TO ATTEND CONVENTION

Geologists planning the trip to California for the annual convention of the American Association of Petroleum Geologists to be held in San Francisco, March 21-23, and in Los Angeles, March 24 and 25, have formulated a schedule from the Mid-Continent fields that will permit them to make the trip together. Forty or more geologists and their wives will make the trip from Tulsa, and an additional 20 or more will go from Norman, Oklahoma City, Ponca City and various points in Kansas. Special cars will leave from Tulsa and Oklahoma City on Friday, March 16, on the Santa Fe Railroad, for Pueblo, Colo., where, by joining those from North Central Texas, a special train will be made up, leaving Pueblo at noon March 17, to go over the Denver & Rio Grande-Western to Salt Lake City, and thence on the Western Pacific to San Francisco, arriving there Monday evening.

The business and technical sessions of the convention of the American Association of Petroleum Geologists will be held in San Francisco and later field trips will be made through the various oil fields in the general vicinity of Los Angeles.

The return trip from Los Angeles will be made on the Santa Fe via the Grand Canyon of the Colorado.

Reservations for the Oklahoma and Kansas groups are being handled by R. S. Rollman, care Santa Fe Railroad, Tulsa, and Richard Hughes, care Burke-Greis Oil Co., Tulsa. The following is a list of the geologists from Tulsa who have made reservations for the trip: H. G. Officer, Miss Dollie Radler, Mr. and Mrs. Sidney Powers, W. B. Wilson, James H. Gardner, C. R. Thomas, Dick Lyons, Mr. and Mrs. J. P. D. Hull, Luther White, R. S. McFarland, Richard Hughes, Wesley Gish, M. M. Valerius, Murray L. Newman, T. K. Harnberger, Mr. and Mrs. G. C. Potter, L. G. Keppler, R. J. St. Germain,, A. F. Truex, Sylvan Price, Earl Treazer, Mr. and Mrs. S. J. Caudill, W. Keeler, Mr. and Mrs. D. R. Snow, Mr. and Mrs. A. G. Oliphant, T. E. Weirick, Mr. and Mrs. E. W. McCrary, and C. L. Severy.

# WILDCAT OPERATIONS IN PANHANDLE

(Continued from Page 46)

Empire G. & F. Co.'s No. 1 C. A. Bell, C SE, Sec. 134, Blk. 3, I. & G. N. Sur. — U.R. 8¼-in. csg., 2,168 ft.

Empire G. & F. Co.'s No. 1 Bender, SE cor. Sec. 164, Blk. 3, I. & G. N. Sur. — Top lime, 2,507 ft; pulling big pipe; T.D., 2,550 ft.

Empire G. & F. Co.'s No. 1 A. J. Dauer, NW SE SE, Sec. 236, Blk. B-2, H. & G. N. Sur. — Building rig.

Empire G. & F. Co.'s No. 1 Holmes, CNE, Sec. 179, Blk. 3, I.&G.N. Sur. — Location.

Eslick et al's No. 1 Mrs. J. A. Hopkins, NW cor. W 80 acres of SW ¼, Sur. 84, H. & T. C., Blk. B-2 — Set 12½-in. csg., 510 ft.

Gibson Oil Corp.'s No. 3 J. B. Bowers, 1,650 ft. from E line and 990 feet from S line, E half, Sec. 92, Blk. B-2 — Drlg. lime, 2,638 ft.

Gibson Oil Corp.'s No. 9 J. B. Bowers, NE cor. Sec. 92, Blk. B-2, H. & G. W. Sur. — Drlg., 850 ft.

Gulf Prod. Co.'s No. 4 J. B. Bowers, SE SW SW, Gulf lease in Sec. 89, Blk. B-2 — Drlg. sand, 830 ft.

Gulf Prod. Co.'s No. 5 J. B. Bowers, SW SE SW, Gulf lease in Sec. 89, Blk. B-2 — Set 15½-in., 528 ft; drlg. gyp. 1,775 ft.

Gulf's No. 2 Holmes, SE cor. NE, Sect. 107, Blk. 3, I. & G. N. Sur. — Drlg. lime, 2880 ft., 25,000,000 ft. gas, 2,870-80 ft; set 6-in. csg., 2,909 ft. to shut off gas; T.D., 2,940 ft.

Gulf Prod. Co.'s No. 1 M. Davidson-A, 330 ft. from S. and E lines of NW cor. E half NW, Sec. 87, Blk. B-2, H. & G. N. Sur. — Drlg. lime, 2,025 ft.

Gurnsey Oil Co.'s No. 2 B. E. McKinney, Sec. 163, Blk. 3, I. & G. N. Sur. — Show oil, 3,025-30 ft; fish., 3,084 ft.

Hardendorf Drlg. Co.'s No. 1 G. A. Henderson, NE E half NE, Sec. 47, Blk. 25, H. & G. N. Sur. — Run. 10-in. csg., 590 ft; S.D.

McAuley et al's No. 1 Morse, SE cor. N half, Sec. 3, Blk. 26, H. & G. N. Sur. — Drlg., 1,700 ft.

Majestic Oil Co.'s No. 4 J. B. Bowers, SW cor. E half, Sec. 92, Blk B-2 — Drlg. red rock, 3,735 ft.

Majestic Oil Co.'s No. 6 J. B. Bowers, Sec. 89, Blk. 2-B — Drlg. hard G.W., 3,735 ft.

Magnolia Pet. Co.'s No. 1 J. Bowers — Made 400 bbls. daily from G.W., 2,853-55 ft; T.D., 2,875 ft; to D.D.

Magnolia Pet. Co.'s No. 1 J. J. Wall, NE cor. Sec. 162, Blk. 3, I. & G. N. Sur. — S. O. & S. G., 3,190-3,202 ft; drlg. lime, 3,285 ft; no production.

Midwest Explt'n. Co.'s No. 1 L. Holmes, Sec. 86, Blk. 3, I. & G. N. Sur. — Show 43 grav. oil in G.W., 3,110-12 ft; cmt. 8-in., 3,015 ft; drlg. red G.W., 3,205 ft; swbd. 58 bbls. in 6 hrs., 3,135-36 ft.

Operators Oil Co.'s No. 2 W. Jackson, NW cor. N ½ NE, Sec. 88, Blk. B-2 — Drlg., 1,840 ft; carrying 10-in. csg.

Osborn et al's No. 1 E. E. Barrett, Sec. 111, Blk. 3, I.&G.N. Sur. — Rig on ground.

Phillips Pet. Co.'s No. 1 Davidson (Myson) — Drlg. red rock, 2,810 ft.

Phillips Pet. Co.'s No. 2 Davidson (Myson), NE cor. NW NW, Sec. 87, Blk. B-2, H. & G. N. Sur. — Drlg., 630 ft.

Phillips Pet. Co.'s No. 3 W. Jackson — Show gas, 2,572-2,600 ft; cmt. 8-in. csg., 2,834 ft; C.O., 2,860 ft; T.D., 2,873 ft.

Phillips Pet. Co.'s No. 2 Jackson-Riley — Run. 8¼-in. csg., 2,705 ft.

Phillips Pet. Co.'s No. 3 Jackson Riley, Sec. 88, Blk. B-2 H. & G. N. Sur. — Recmntd. 12½-in., 1,027 ft; drlg. 2,710 ft; 6,000,000 ft. gas, 2,590-2,635 ft.

Phillips Pet. Co.'s No. 4 Jackson-Riley, SE cor. W half SW, Sec. 88, Blk. B-2 — Fish., 310 ft.

Pampa Oil Co.'s No. 1 W. R. Campbell, Sec. 90, Blk. 3 — 700 ft. wtr., 3,430 ft; S.D., 3,422 ft.

Purple Sage Oil Co.'s No. 2 E. B. Johnson — S.D., 1,980 ft.

Ray & Massie's No. 1 A. Chapman, NE NW SW, Sec. 51, Blk. 25 — Drlg. hard lime, 2,535 ft.

Rensaul Pet. Co.'s No. 2 M. Hus-lby, NE cor. SW, Sec. 55, Blk. 25, H. & G. N. Sur. — T.L., 1,675 ft; set 8¼-in., 1,851 ft.

St. Clair Oil Co.'s No. 1 C. H. Rowe — Spud. and S.D.

St. Clair Oil Co.'s No. 1 L. S. Stocklon, SE cor. Sec. 35, W. R. Lee Sur. — Spudded and S.D.

Shamrock Oil Co.'s No. 1 Chapman, NE E half SW, Sec. 50, Blk. 25 — 5,000,000 ft. gas, 2,660-70 ft; T.D., 2,680 ft; cmt. 6-in. csg., 2,655 ft; S.D., 2,680 ft.

Skelly Oil Co.'s No. 1 Bradford, NE cor. Sec. 118, Blk. B-2, H. & G. N. Sur. — 12,000,000 ft. gas, 2,765 ft; fish. bit, 2,775 ft.

Spartan Oil Co.'s No. 1 J. Hopkins — Spud and S.D. for water.

Sullivan et al's No. 1 A. Chapman-A — 23,000,000 ft. gas, 2,280-2,300 ft; drlg., 2,535 ft; S.O., 2,345-50 ft.

Sullivan et al's No. 1 S. A. Cobb, NE cor. NW, Sec. 64, Blk. 25, H. & G. N. Sur. — Location.

Sun Oil Co.'s No. 1 Jackson — Top lime, 2,035 ft; to rerun 6-in., 2,950 ft.

Staggers Oil Co.'s (was Ruby Oil Co.'s) No. 1 B. F. Tally — T.D., 635 ft; S.D.

The Texas Company's No. 2 J. B. Bowers — Show gas, 2,810 ft; show oil, 3,820 ft; S.D., 3,200 ft.

The Texas Company's No. 3 J. B. Bowers — Fish., 2,765 ft; 44,000,000 ft. gas.

The Texas Company's No. 4 J. B. Bowers, SE cor. SE, Sec. 93, Blk. B-2 — Cmtd. 8¼-in. csg., 2,108 ft.

The Texas Company's No. 2 H. M. Davis, SW cor. NW, Sec. 86, Blk. 3 — Set 8¼-in., 2,150 ft; drlg., 2,915 ft.

The Texas Co.'s No. 1 M. B. Davis, SE cor. NE, Sec. 8, Blk. 1, A. C. H. & B. — Spudded.

The Texas Co.'s No. 1 S. McLarty-A, SW cor. E ½ NW, Sec. 1, Blk. 1, A.C.H.&B. Sur. — T.D., 2,835 ft; making 30,000,000 ft. gas; spraying oil.

The Texas Company's No. 1 S. McLarty — T.L., 1,712 ft; drlg., 2,110 ft.

Tobias Oil Corp.'s No. 1 W. H. Taylor, C NE, Sec. 10, Blk. B-2 (formerly Smallwood et al's) — Rig burned; 835 ft; rebldg.

The Texas Co.'s No. 1 C. Thut, C N half of E 320 A, Sec. 1, H. & G. N. Sur. — Drlg., 2,565 ft; 10,000,000 ft. gas, 2,436-40 ft.

The Texas Co.'s No. 1 M. B. Davis, SE cor. NE, Sec. 8, Blk. 1, A. C. H. & B. Sur. — Bldg. rig.

The Texas Co.'s No. 2-A Chapman, NE cor. NW NW, Sec. 51, Blk. 25, H. & G. N. Sur. — Drlg., 835 ft.

The Texas Co.'s No. 1 J. E. Williams, NW cor. NE NW, Sec. 7, Blk. 1, A. C. H. & B. Sur. — Rig on ground.

Viola Oil Corp.'s No. 1 G. H. Saunders — Spudded and S.D.

## HALE COUNTY

Bailey & Young's No. 1 Thomas, Sec. 1, Blk. J.K.L. — S.D., 175 ft.

Donnell Pet. Co.'s No. 2 Mullican, NW cor. Sec. 66, Blk. A-3, I. & S. B. Sur. — Top pay in sandy shale, 405 ft., ⅛ bailer oil and 3 bailers wtr. per day; S.D., 620 ft.

Donnell Pet. Co.'s No. 1 Mullican, C Sec. 21, Blk. B, R. M. Thompson Sur. — 200 ft. fluid in hole from 407-14 ft; S.D.

Explt'n. Co.'s No. 1 Goodman — Spudded and S.D.

Explt'n. Co.'s No. 1 Woodman — S.D., 350 ft.

A. S. Mimm's No. 1 W. A. Ritcher, 700 ft. from east line and 1,200 feet from south line, Sec. 17, Blk. X, John Glynn Sur. — S.D., 1,140 ft.

Tolbert & Simms' (was Gouldy & Stone's) No. 1 Kitteral, SE cor. NW, Sec. 65, Blk. A-3, G. C. & S. F. Sur. — S.D., 485 ft.

## HALL COUNTY

Briscoe Oil Assn's (was Seifert et al's) No. 1 Owens, C NE, Sec. 179, Blk. S-5, Dennison & Pacific Sur. — Spudded and S.D.

## HANSFORD COUNTY

Caldwell et al's No. 1 J. Adriance est. — Drlg., 1,030 ft.

Oklavania et al's No. 1 Coots, Sec. 13, Blk. 45, H. & T. C. Sur. — Cmt. 10-in. csg., 990 ft; drlg., 1,119 ft.

## HOCKLEY COUNTY

World Oil Co.'s No. 1 Ellwood — S.D., 1,455 ft. to install rotary

Deep Rock Oil Co.'s No. 1 Lymann & Balfour, Sec. 9 — Preparing to abd., 4,038 ft.

J. E. McKanna's No. 1 Francis Farwell — C.O., 3,501 ft to drill deeper; abd., 10-20-27.

## HEMPHILL COUNTY

Hoover et al's No. 1 Schaller est., Sec. 4 — Spudded and S.D.

Hoover et al's No. 1 fee, J. S. Hood Sur. — 360 ft. wtr. in hole; S.D., 5,060 ft rainbow show.

## HUTCHINSON COUNTY

Alamoso Oil Co.'s No. 2 J. M. Sanford, Sec. 83, Blk. 46, H.&T.C. Sur. — Building rig.

R. G. Barnum et al's No. 1 Garland Sanford, Sec. 78, Blk. 46 — Rig.

Beam et al's No. 1 Cockrell, Sec. 3, Blk. 23 — S.D., 405 ft. for orders.

Big Coach Oil Co.'s No. 1 Dunnaway, Sec. 5, Blk. Y — S.D., 750 ft.

Conklin et al's No. 1 Johnson, Sec. 1, Blk. X03, H. & O. B. Sur. — S.D., 600 ft.

Dixon Creek Oil Co.'s No. 1 Burnett est., NW cor. of E 240 A of N 320 A, Sec. 120, Blk. 5, I. & G. N. Sur. — Run. 15-in., 450 ft; drlg., 1,710 ft.

Harris et al's No. 1 J. Q. Bost, Sec. 10, Blk. Y-2, T. T. R. R. Sur. — Drlg., 2,440 ft; 35,000,000 ft. gas.

Holmes & Quinn's No. 1 J. K. Quinn, SW cor. Sec. 9, Blk. 3, B. S. & F. Sur. — Drlg., 1,100 ft.

McMan O. & G. Co.'s No. 1 Albert Yake, SW cor. SE, Sec. 2, Blk. J, H. & G. N. Sur. — Set 8¼-in. pipe, 2,107 ft. Show gas 2,220 ft; 10,000,000 ft gas; spraying 10 bbls. daily, 2,990-92 ft; S.D. for tankage.

Phillips Pet. Co.'s No. 12 Elva-Whittenburg, E. Tomlinson Sur. — T.A., 4,445 ft.

Phillips Pet. Co.'s No. 1 Perkins-Hamilton, SW cor. of N 240 acres of S half, Sec. 22, Blk. 47, H. & T. C. Sur. — Location.

Skelly Oil Co.'s No. 2 Armstrong & Byrd — Run. pipe, 1,200 ft.

Skyrocket Oil Co.'s No. 1 Mrs. R. A. Jameson — 800 ft. oil in hole from 3,146 ft; drilled to 3,180 ft; shot with 60 qts., 3,125-60 ft; bridged; no increase in oil after deepening; pumped 25 bbls. in 5 hrs; S.D.

The Texas Co.'s No. 1 Cockrell-B, Sec. 3, Blk. B-3 — T.P., 3,015 ft; 500 ft. oil in hole; run liner, 3,040 ft; C.O., 3,110 ft; to pump.

Wendell et al's No. 1 Johnson Bros. — Drlg., 1,050 ft.

## KING COUNTY

Humble O. & R. Co.'s No. 1 Pitchfork, Sec. 171, Blk. A-96, John H. Gibson Sur. — Hole full wtr., 3,375 ft; U.R. 8-in. csg., 3,435 ft; C.O. crooked hole, 3,680 ft.

J. L. Pattison's No. 1 Patton — Slight show gas, 2,115-20 ft; fish., 3,410 ft.

## LAMB COUNTY

Dan Freel et al's No. 1 Ellwood, CWL Sec. 9, Blk. T, T. A. Thompson Sur. — Spudded and S.D.

Spade Oil Co.'s No. 1 Andrews, 1,085 ft. from N line and 200 ft. from E line, Labor 23, League 643, (5 miles NE of Littlefield) — Spud and S.D.

Tolbert & Simms' No. 1 Ellwood, NE SW SW, Sec. 14, Blk. B, R. M. Thompson Sur. — 712 ft; small show oil and hole full wtr.; dry, 1,504 ft; temp. abd.

## LIPSCOMB COUNTY

Cal-Tex's No. 1 Bradford, C NE NE, Sec. 899, Blk. 43, H. & T. C. Sur. — Spudded and S.D.

Camp Creek Oil Co.'s No. 1 Mrs. H. D. May, Sec. 612, Blk. 43 — S.D., 2,000 ft.

McCorkle's No. 1 A. Barton, NE cor. SW SE, Sec. 504, Blk. 43, H. & T. C. Sur. — Wtr. in lime, 4,126-40 ft; 6-in. set, 4,155 ft; 5 3/16-in. csg. set, 4,420 ft; S.D., 4,705 ft.

Ozark Drlg. Co.'s No. 1 Frass, NE SE, Sec. 106, Blk. 10, H. & T. C. Sur. — Rig on ground.

Smith, Kinsley & Ruby's No. 1 C. W. Jones, NE cor. SW, Sec. 100, Blk. 43 — Show oil, 3,520 ft; S.W., 3,900 ft; U.R. 6-in. csg., 4,380 ft.

## LUBBOCK COUNTY

Center Oil Co.'s No. 1 Bowles ranch — Small show oil, 1,133-40 ft., in sand; S.D., 2,730 ft.

## MOORE COUNTY

Amarillo Oil Co.'s No. 1 Thompson-Amarillo, C, Sec. 22, Blk. 26, E. L. & R. R. Sur. — Set 24-in., 120 ft; drlg., 720 ft.

Prairie and Shamrock's No. 2 Gober, Sec. 16, Blk. M-21 — T.D., 2,520 ft; cmntd. 10-in. csg., 2,636 ft; drlg. plug.

## MOTLEY COUNTY

Explt'n. Co.'s No. 1 Burleson — Spudded and S.D.

Explt'n. Co.'s No. 1 Tillson — S.D., 750 ft. for repairs.

Explt'n. Co.'s No. 1 Matador Land & Cattle Co., C SW, Sec. 37, John Gibson Sur. — S.D., 1,002 ft.

Wheeler et al's No. 1 C. D. Bird, C NE, Sec. 4, Blk. S, Stephens Sur. — Spudded and S.D.

## OLDHAM COUNTY

Prairie O. & G. Co.'s No. 1 Landegrin, SE cor. NE SW, Sec. 46, League 310, Capital land — 1,900 ft. wtr., 4,085-93 ft; 1 bailer wtr. per hr. and light scum oil, 4,527 ft. (steel line meas.) cmt. 6-in., 4,442 ft; 2,000 ft. S.W., 4,850-56 ft; T.D., 5,645 ft; fish. for csg.

## OCHILTREE COUNTY

W. G. Burton's No. 1 Strickler — Drlg., 3,990 ft.

Hamilton et al's H. E. Wamble — S.D., 250 ft.

McCorkle P. L. Co.'s No. 1 R. H. Moore — S.D., 1,600 ft.

Montgomery's No. 1 Weinett — S.D., 850 ft.

Standard Development Co.'s No. 1 Bowen — S.D., 900 ft.

## POTTER COUNTY

Amarillo Oil Co.'s No. 1 Masterson-K, C SW, Sec. 85, Blk. O-18, D. & P. R. R. Sur. — Recmtng. 12¼-in. csg., 1,000 ft; drlg., 1,040 ft.

Amarillo Oil Co.'s No. 1 Fuqua, C NW, Sec. 18, Blk. 6, B. S. & F. Sur. — Spudding, 200 ft.

Amarillo Oil Co.'s No. 1-E Lee Bivins, C NW, Sec. 27, Blk. O-18, D.&P.R.R. Sur. — Location.

El Rio Oil Co.'s No. 1 River Bed, 530 ft N and 670 ft. W of NE cor. Sec. 106, Blk. 46, H.&T.C. Sur. and in Canadian River Bed — Location.

Frank Allen et al's No. 1 W. H. Bush — S.D., 410 ft; corrected T.D.

## RANDALL COUNTY

Westbrook Oil Co.'s No. 1 J. Beckman, SW cor. SE NE, Sec. 46, Blk. B-5 — Drlg., 2,950 ft.

## ROBERTS COUNTY

Big Bend Oil Co.'s No. 1 Mrs. H. Ledrick & Sons, Sec. 7, Blk. 5-A — Show gas, 4,990 ft; show oil, 4,992 ft; csg. set, 4,992 ft; T.D., 5,153 ft; set 3-in., 5,155 ft; drlg., 5,168 ft.

## SHERMAN COUNTY

Gibson Oil Co.'s No. 1 Bivina, Sec. 35, Blk. 3-B — 100,000 ft. gas, 2,016-26 ft; T.D., 3,353 ft; 2,000 ft. S.W., 3,325-33 ft; S.D., 3,410 ft.

## WHEELER COUNTY

Byrens et al's No. 1 Johnson, SW cor. NE, Sec. 88, Blk. A-5, H. & G. N. Sur. — U.R. 10-in. csg., 825 ft.

Clark et al's No. 1 J. D. Purcell, C NW SW, Sec. 51, Blk. 17, H.&G.N. Sur. — Location.

Rook et al's (was Foster et al's) No. 1 S. H. McDonald, SE cor. NW SW, J. N. Lindsay Sur. — S.D., 2,800 ft.

Hatcher et al's No. 2 J. Hatcher, C NE SW, Sec. 80, Blk. 23, H. & G. N. Sur. — S.D., 1,675 ft. for pipe.

Mid-Kansas O. & G. Co.'s No. 1 J. L. Newton, Sec. 92, Blk. 17, H. & G. N. Sur. — U.R. 8¼-in. csg., 1,920 ft.

Rook & Angus' No. 1 Smock (Linkey) C SE SE, Sec. 5, Blk. 24, H. & G. N. Sur. — To run 6-in., 1,980 ft; 8-in. froze.

Sabien Oil Co.'s No. 1 E. L. Woodley, C SE SE, Sec. 21, Blk. 24, H. & G. N. — Cellar.

Smith Brady et al's No. 1 P. J. Sorenson, Sec. 53, Blk. A-4 — S.D., 2,120 ft. for orders.

Sun Oil Co.'s No. 1, G. Krc. C NW NW, Sec. 127, Blk. 23 — U.R. 8¼-in. csg., 1,420 ft.

The Texas Co.'s No. 3 Morgan, Sec. 92, Blk. 17 — 1,000,000 ft. gas, 1,835 ft; show oil, 2,327 ft; drlg., 2,467 ft.

Vaughan et al's No. 1 M. Ackley — Location.

H. Vaughan et al's No. 1 C. C. George, C SE NW, Sec. 96, Blk. 17, H. & G. N. Sur. — Drlg., 300 ft.

Vaughn et al's No. 1 B. Woodley, C SW NW, Sec. 21, Blk. 24, H. & G. N. Sur. — Location.

Vaughn et al's No. 1 A. Wood, C NW SW, Sec. 21, Blk. 24, H. & G. N. Sur. — Location.

Vaughn et al's No. 1-B M. Ackley, C NE NW, Sec. 4, Blk. 27, H. & G. N. Sur. — Rig on ground.

Kaufold et al's No. 1 E. R. Wallace — Spudded and S.D.

Woodtex Oil Co.'s No. 1 C. A. Linkey — Drlg., 2,160 ft; G.W.

Pete Woodley's No. 1 J. Boyle — U.R. 8¼-in., 1,220 ft.

# Technical Questions Answered

BY CHARLES K. FRANCIS, PH.D., TECHNICAL EDITOR

*This department of The Oil and Gas Journal is devoted to the manufacturing branches of the oil industry.*

*Those connected with the refining of crude petroleum, the manufacture of natural gasoline and closely allied industries are invited to submit their problems to Dr. C. K. Francis, technical editor. The department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products.*

*Questions should be submitted in as much detail as possible so as to assure a satisfactory answer.*

*All inquiries should be signed and if other than the given initials are to be used please indicate the desired letters.*

*Questions involving patented processes, intricate formulas and calculations and estimates of costs, for obvious reasons, cannot be answered. The replies will appear on this page within a reasonable time.*

## EXTRACTION OF BUTANE FROM NATURAL GAS

**Is it advisable to extract butane at the beginning of the heating operation of the fat oil or at the end of the cooling of the gasoline vapors in gasoline plant operation?—E. G. S.**

Butane, as such, can probably not be extracted at the beginning of the heating operation of the fat oil; because the primary still, through which venting would be accomplished, would permit the ethane and propane present in the oil to escape with the butane, in as much as the boiling points of ethane and propane are lower than those of butane. At the reduced pressure and increased temperature, all of these fractions would be apt to leave the oil possibly along with some heavier fractions such as pentane. Moreover, a considerable quantity of butane would still be left in the oil, because an exact separation by primary and single distillation is not possible.

At the end of the cooling of the gasoline vapors, it is possible to obtain the greatest yield of butane and lighter fractions by careful weathering. Better still, by some form of fractionation at either high or low pressure, according as indicated by the particular condition. In the past few years fractionating towers of either type have been developed and are in use today, by which the quantity of butane remaining in the gasoline may be carefully controlled and excess butane eliminated practically automatically.

## CRACKING WITH SPECIAL CLAYS

**When passing oil vapors through acid-treated clays is there any cracking due to the catalytic action of the clay?—T.H.M.**

We cannot give a direct answer because sufficient work has not been done. Probably there is. The following may be of interest:

Cracking heavy mineral oils with Japanese acid clay is discussed in the February 4 issue of The Petroleum Times (page 218). The authors of the article are the Messrs. Kyuhei Kobayashi and Ken-Ichi Yamamoto of the Department of Applied Chemistry, Faculty of Engineering, Waseda University. The cracking action of the clay was studied at varied temperatures with a view to increasing the yield of gasoline. Three kinds of typical classes of oils were used: namely (1) gas oil, (2) California heavy oil, and (3) California residual oil. The results of the study are summarized as follows: In the cracking of heavy mineral oils, Japanese acid plays just the same role as pressure does. It has a remarkable absorptive power. Oil liquids are firmly caught on its surface taking a state of thin films. The nature of the cracking action is extremely complicated, and may possibly be due to the combined effects of absorption, polymerization, coalization and decomposition. The yield of gasoline fraction increases in proportion to the amount of the acid clay; the total yield of the cracked distillates has, however, successively decreased. It has been found that a good result may be obtained by heating at a low temperature and thus keeping the run at a slow rate; (3) heavy oils containing paraffin may be cracked most easily. It can be seen that oils composed of the fraction 275-350 degrees Centigrade are the most favorable material for the cracking purpose; (4) it is worthy to note that Japanese acid clay manifests an almost identical effect upon heavy oils as pressure does. Thus, for example, when acid clay was used 10 times the weight of the oil taken, practically the same results was obtained as the cracking would be performed under 10 atmospheric pressures, although the authors do not look upon the mere numerical coincidence as a matter of importance.

## VISCOSITIES IN TERMS OF REDWOOD, ENGLER, AND SAYBOLT

**Will you give me the equivalent viscosities in terms of Redwood and Engler of lubricating oils testing 250 and 500 Saybolt Universal, together with a reliable reference for such conversions?—D. M. T.**

Day's Handbook of the Petroleum Industry, Vol. 1, page 642, shows in a conversion table 250 Saybolt to be approximately equivalent to 200 Redwood and 6.91 Engler. From the same table 500 Saybolt is the same as 398 Redwood or 13.75 Engler.

There appeared in The Oil and Color Trades Journal, January 6, 1928, page 17, an extended table for the conversion of viscosities. This table indicates 253.7 Saybolt to be the same as 215 Redwood and 7.45 Engler; also. 501.5 Saybolt to be the same as 425 Redwood or 14.66 Engler.

It must be understood that conversions of this kind give approximate figures and when the matter is of importance the final result should be determined by means of the specified instrument.

## CONDITION OF WAX IN CRUDE OIL

**Does the paraffin wax contained in crude oil naturally exist as amorphous or crystalline wax? If it exists as amorphous wax, why can't it all be changed to crystalline wax and removed?—W.H.B.**

Paraffin wax is not a pure or uniform substance, being a mixture of various hydrocarbons, but varies in its physical properties as prepared from different crude oils, and even from the same oil, according to the conditions of separation. While a soft wax may be obtained from an oil under one set of conditions, slight alterations in these will enable one to make a hard wax. Commercial wax is made by a series of operations which usually include distillation, cooling the distillate or the residue, pressing, and purification by treatment with chemicals or filtering. When an effort is made to extract the wax by solution in a solvent a soft mass which is quite amorphous is obtained.

Several investigators have shown that crystalline waxes are present in petroleum and also in the mineral wax ozokerite, which is usually considered to be amorphous. It is suggested that while the crystalline waxes may be already formed, there are colloidal substances present which prevent the formation of wax crystals so that the mixtures always appear amorphous. We know that resinous and asphaltic bodies interfere with the crystallization of the wax, because when these are removed from an oil larger yields are obtained. Zaloziecki has presented the theory that the crystalline waxes belong to the series of normal hydrocarbons, while the colloids are isoparaffins. The distilling operation may change the amorphous low melting protoparaffins into hard crystallin pyroparaffins, which after passing through the refining process become commercial wax. A convincing proof of the existence of crystalline wax in petroleum may be obtained by microscopical examination.

It is simply a matter of thoroughness when absolute removal of wax from an oil is desired. Some refiners make a zero cold test lubricating oil from paraffin base crudes; but the same plant may make an oil containing more wax, consequently higher cold test, when the market does not demand oil having an exceptionally low cold test. The market price for paraffin wax does not warrant the high operating costs for complete extracting of all the wax from petroleum.

## VENEZUELA CRUDE GRAVITY AND PROPERTIES

**What is the gravity of Venezuela crude; would also like to have the gasoline content and other properties of this oil?—A. T.**

Analyses of several Venezuela crudes have been reported by the Bureau of Mines. These were discussed by A. J. Kraemer in The Oil and Gas Journal, August 4, 1927, page 99, from which the information given below is taken.

| Sample from— | Grav. | Sulphur Pct. | Gasoline Pct. | Grav. |
|---|---|---|---|---|
| Mene Grand .. | 16 0 | 2 65 | 9.2 | 48 .3 |
| ..... ..... | 17.9 | 2.51 | 14.6 | 53.2 |
| Ambrosio .... | 21.3 | 2.02 | 13.2 | 55.4 |
| La Rosa .... | 25 2 | 1 69 | 18 9 | 57 4 |
| La Concepcion. | 33 4 | 0 88 | 21 0 | 54 2 |
| El Mene ..... | 35.2 | 0.38 | 47.4 | 55.7 |

Analyses of two samples from the Lake Maracaibo Basin—the first two, are included in this report. The crudes are much alike, being fairly heavy, black oils, rather high in sulphur (average 2.58 per cent), rather low in "gasoline and naphtha" (average 11.9 per cent), and containing considerable proportions of vacuum distillates, which do not show wax content. They show no kerosene distillate by the Bureau of Mines analyses and interpretation. The carbon residue or residuum is high, average 20.7 per cent, as might be expected from the large content of sulphur. The samples are similar to many of the crudes, especially the heavier high-sulphur oils, of Kern County, California. These Kern County crudes do not contain as much sulphur as the Venezuela samples and the carbon residue of residuum is correspondingly less. In other respects the Kern County and the Venezuela crudes are much alike.

With the exception of the last two samples, these oils are low in gravity, have a high sulphur content, and by direct distillation yield very little high-grade gasoline. The El Mene oil is unique as it appears to be a high grade crude, low in sulphur, and yielding an exceptional quantity of gasoline for the indicated gravity.

## PHYSICAL TESTS OF LUBRICATING OIL

**What physical test is considered the most valuable in determining the rate of consumption on a motor lubricating oil? —V.H.B.**

The ordinary physical tests are not expected to serve as means for determining rate of consumption, but the experienced operator may make some interpretations from these tests which will enable him to form an opinion about the stability and the quantity necessary in a known kind of service.

These tests may include the following:

Density.
Color.
Coefficient of expansion.
Surface tension.
Capillarity.
Specific heat.
Distillation.
Loss by evaporation.
Flash and fire point.
Pour and cloud.
Viscosity.
Emulsification.
Oxidation and gumming.
Carbon residue.
Sediment.

Such tests enable the manufacturer to maintain quality and are used by the purchaser to satisfy himself that the grade meets desired specifications. The matter of consumption rests with the conditions under which an oil may be used, so that when a satisfactory result has been obtained any change in the quality of the oil will be reflected in the quantity required. Probably steam conditions have a greater influence on oil consumption than any other factor; a wet steam requires more cylinder oil, for example, than a high temperature dry steam. It has been shown that the consumption of the same grade of oil in the same engine is greater in the tropical sections of the Atlantic than in the northern part of the Atlantic.

Thomsen, in Practice of Lubrication, gives tables showing consumption of lubricating oil from which the following are quoted:

Consumption in grams per B.H.P. hour:

| | Steam Engines— | |
|---|---|---|
| Horsepower— | Horizontal Engines | Vertical Engines |
| Below 400 ..... | 1.0 — 0.3 | 0.6 — 0.15 |
| Above 400 ..... | 0.6 — 0.15 | 0.4 — 0.05 |

The oil consumption of Diesel engines ranges from 0.75 to 5.0 grams per B.H.P. hour. The lowest oil consumption is obtained with large four-stroke cycle Diesel engines of the crosshead, enclosed type, employing force-feed circulation. The following oil consumption is typical of such engines:

| | |
|---|---|
| Cylinders ..... | 0.15 grams per B.H.P. hour |
| Force feed cir. system ..... | .60 grams per B.H.P. hour |
| Air compressors... | .05 grams per B.H.P. hour |

## TESTS FOR CAR OIL

**What would be considered as the proper tests for a car oil?—J.T.M.**

Tests of car oils vary to a considerable extent as indicated in the following:

| | |
|---|---|
| Gravity ..... | 22 to 26 A.P.I. |
| Saybolt viscosity at 100..... | 240-350 |
| Saybolt viscosity at 210..... | 60- 80 |
| Flash ..... | 390-450 |
| Fire ..... | 450-600 |
| Pour ..... | 0 to 50 Fahr. |

The higher limits are found to apply to the summer grades.

Some of the manufacturers of special oils claim that a car oil should be a compounded product, made up largely of fish oils and fish stock soaps, and compounds of this character are frequently found in car oils varying from a trace to 15 per cent. A good car oil should be free from sediment and contain no acid or alkaline material.

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# SMITHSTEEL

CRACKING STILLS

# New Vapor Phase Cracking Process

## Unit at Pure Refinery Produces Gasoline Equal to Benzol in Antiknock Value. Operation Continuous at Atmospheric Temperature

By R. C. Osterstrom
*Chief Chemist, Pure Oil Co.*

One of the most important problems, possibly, facing the petroleum refiner today is the economical production of motor fuels of high antiknock value. The demand for this type of motor fuel is rapidly increasing. When the problem for supplying this demand first took definite shape, the Pure Oil Co., in conjunction with a group of Detroit capitalists, undertook the development of a process that might solve this problem. After a long period of experimentation, it was finally decided that sufficient evidence had been obtained to indicate that a commercial-size unit would be successful. At the Cabin Creek, West Virginia, refinery of the Pure Oil Co. a unit of the process was erected and put into operation.

This process, known as the Gyro process, produces a very remarkable series of products. It is a "cracking" process, but unlike the general run of cracking systems, the cracking is done at atmospheric pressure in the vapor phase, and the elimination of high pressures reduces heavy maintenance expense and almost entirely eliminates extreme fire hazards and danger to human life. Another novel feature of the process is that it produces no coke, and since in the liquid phase the time on stream depends altogether on how long it takes to fill a reaction chamber with coke, the elimination of the making of coke permits of practically continuous operation—a much sought after effect in all refining processes.

### Method of Operation

Referring to the flow diagram: The fresh oil is taken from tank A by pump B and sprayed into tar leg C. Any oil which can be vaporized is suitable charging stock for a Gyro unit. At Cabin Creek, gas oil, foots oil and petrolatum from Cabin Creek crude are used. The liquid from the tar leg (that part not vaporized) flows by gravity into a reservoir in the bottom of fractionating tower D. The material to be processed is then pumped by means of hot oil pump O and passed through tube still E where it is brought to a temperature sufficient to vaporize the portions it is desired to process.

From the tube still the oil is charged into evaporator F, the unvaporized portions dropping out in this evaporator and being removed as fuel oil. In the evaporator steam is introduced. The steam and oil vapors pass from this point through a separator G where any large amounts of entrained liquids are removed and drained back to the bottom of the fractionating tower D. After leaving separator G, the vapors pass through "converter" unit P and at this point are brought to conversion temperatures.

A novel feature should be mentioned in the converters—the use of an iron oxide catalyst in the tubes. The catalyst is made up as a cylindrical core of concrete impregnated with the iron oxide; the concrete being merely the carrying medium. The core is supported in the center of the tubes to eliminate the possibility of developing hot spots.

Steam dissociation makes available hydrogen and oxygen—the hydrogen in the presence of the catalyst at these temperatures combining with unsaturated hydrocarbons to form new compounds. In the event charging stock from crudes are used which contain high percentages of sulphur, the iron oxide might be changed to iron sulphide, but the free oxygen obtained in the dissociation of the steam would replace the sulphur and prevent "poisoning" of the catalyst. As a result, therefore, it has been found necessary to replace these cores only when they begin to disintegrate; the replacement being approximately 10 per cent per year.

The vapors pass from converter P into tar leg C, where as stated above, fresh charging stock is introduced. The uncondensed vapors pass from the tar leg C into the fractionating tower D where the material that was not converted is dropped out to the bottom of the tower, and the desired vapors having the boiling point of the finished product, pass overhead and may be led through purifying tower H. This purifying tower, if desired, may be of the design usually used in vapor phase filtering, wherein fullers earth or similar material is utilized. The treated vapors pass from purifying tower H to a second fractionating tower I, where final separation of the undesirable hydrocarbons is accomplished and the desired products pass overhead through final condenser J to gas separator K. In gas separator K the finished Gyro is separated from the fixed gases produced in the converter operation. Of course, the fixed gases eventually pass through a compression gasoline recovery system so that the gas leaving the system is practically free of stable gasoline, and can be used for fuel.

The fresh charging stock is introduced in the tar leg. To prevent the accumulation of charging stock in the reservoir in the base of the fractionating tower D, a second hot oil pump L removes the excess, pumping it through a coil in tower I, where the hot oil is used as an aid for fractionating in tower I. After passing through this coil, the excess hot charging stock goes through a double pipe heat exchanger M, and the heat utilized for the generation of steam that is used in the process. After passing through this heat exchanger, the oil then passes through a final cooling coil and back to storage A. The outlet temperature of tower D is maintained constant by means of an automatic control steam boiler which also generates steam for the process. The steam may be superheated by passing it through superheater coil N installed between the pipe still and the stack.

*General view of Gyro cracking unit at the Cabin Creek, West Virginia, refinery of the Pure Oil Co.*

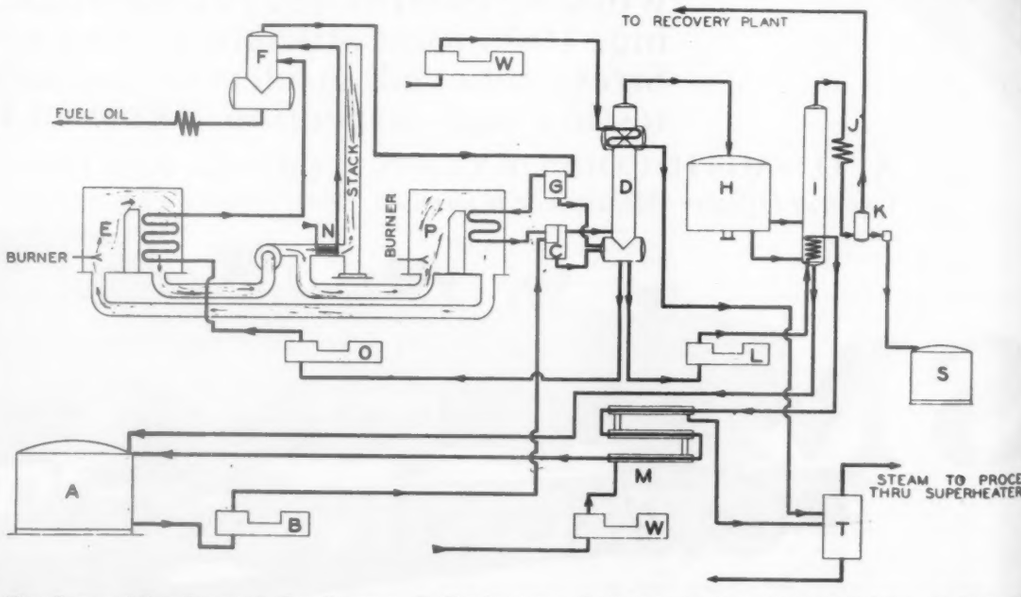
### Fuel System

Another novel feature is the fuel system put into effect in this installation. The principal combustion of the fuel takes place in the converter P. The temperatures reached in this combustion chamber are approximately 3,000 degrees Fahrenheit. At the top of the combustion chamber and before making contact with the tubes, these gases at this temperature are diluted with gases of about 500 degrees Fahrenheit. The temperature of the diluted gases that actually make contact with the tubes is approximately 2,000 degrees Fahrenheit. The flue gases leaving the converter at around 1,400 degrees Fahrenheit are drawn into the combustion chamber of tube still E and across the tube heating surface. Tube still E is provided with a combustion chamber making it possible to make up any heat deficiency that might exist when the gas is brought from converter P. The flue gases leaving tube still E at approximately 500 degrees Fahrenheit are conducted through ducts by means of a circulating fan and circulated back to the converter P for dilution as mentioned above. Any excess gas handled by the fan is discharged across the steam superheater N and thence up the stack. Every precaution has been taken to prevent leakage of air into any part of the settings or ducts. Also, the converter combustion chamber is operated with practically no excess air. Naturally, these precautions make for longer life of the tubes in preventing oxidation.

### Yields

The gas oil from Cabin Creek crude, when this material is being used for

(Continued on Page 242)




*Flow diagram of Gyro Process—A—Gas oil storage. B—Charging pump. C—Tar leg. D—Main fractionating tower. E—Tube still. F—Evaporator. G—Separator. H—Purifying tower. I—Final fractionating tower. J—Final condenser. K—Gas Separator. L—Hot oil pump. M—Steam generator. N—Superheater. O—Hot oil charging pump. P—Converter. S—Rundown tank. T—Steam separator. W—Water pumps.*

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If you buy on a basis of *past* performance, you will choose Foxboro. Foxboro instruments have the unqualified endorsement of the leaders in the oil and gas industry.

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*THE COMPASS OF INDUSTRY*

Instruments for Indicating, Recording and Controlling Temperature, Pressure, Humidity and Flow

# Of Interest to Sales Departments

## SYNTHETIC GASOLINE IN GERMAN MARKET

Synthetic gasoline entered the German market in October, 1927, after several months of experimental production, but has not as yet been taken up by the average consumer. It bears no special trade name and is being supplied from stocks of Deutsche Gasolin A. G., which has been selling imported gasoline charged with "motyl" or iron carbonyl under the trade name "motalin" as an antiknock. It is assumed that the German manufacturers have not wished so far to sell its synthetic product in open competition with imported American, Russian and other petroleum gasolines.

It is significant that Deutsche Gasolin A. G. has entered into friendly relations with the newly created Benzolvertrieb G.m.b.H. of Berlin, suggesting that I. G. Farbenindustrie prefers to unite with a purely German sales enterprise. Benzolvertrieb controls practically all the German coke-plant benzol, and also deals in Russian gasoline. Through it, I. G. Farbenindustrie establishes contact with the Ruhr coal mines via Gesellschaft fuer Teerverwertung, but the organized Ruhr operators are opposed to the I. G. interests in such enterprises as pipe lining Ruhr coke-oven gas.

This product is handicapped for it enters the market under conditions of increasing production of petroleum gasoline and low prices. World production of gasoline is estimated at 7,700,000 tons, and of benzol at 750,000 tons, half of the latter originating in the United States, while Germany accounts for about 250,000 tons annually exclusive of gas-plant benzol and imports. Consumption of gasoline for internal-combustion engines in Germany in 1926 is estimated at 750,000 tons, probably to be increased to 1,000,000 in 1927-28. Against these conditions is overproduction in the United States and increasing Russian competition.

## NEW PREMIUM FUEL ANNOUNCED BY SKELLY

The Skelly Oil Co. has announced a new premium gasoline to be sold at its own stations and also to be available to the jobbing trade. The name of the new gasoline is "Aromax," an adaptation of aromatics, the hydrocarbons in gasoline, which are desirable in gasoline of high antiknock value.

The company in its announcements states that the new gasoline was developed by its technical staff, a motor fuel made entirely from crude oil. The antiknock feature is not produced by any added substance, but is inherent in the gasoline. The refining process through which the crude oil passes in the making of this gasoline produces a high percentage of aromatic hydrocarbons, which, as all petroleum chemists know, are the materials which produce the desired antiknock effect.

"Aromax" will in no way replace Skelly refractionated gasoline, but is offered to fill the need for a premium gasoline and is sold at a retail price of 3 cents above the station price of ordinary gasolines.

"The name Aromax has been chosen because it expresses the fact that this gasoline has a maximum content of aromatic hydrocarbons. Only for the purpose of identification, Aromax is colored a rich, brilliant orange color.

## KEROSENE IMPORTS IN CHINA

Kerosene import figures when compiled for the whole of China will doubtless show a considerable decline in 1927, as the larger companies were obliged to cease activities in Szechuen and Hunan, losing heavy stocks by military seizures, while in several other areas distribution has been restricted or at times impossible owing to special kerosene taxes, high transportation costs, military levies, and depreciated currencies. In spite of downward trend in suppliers' quotations, these have contributed to an excessive cost to the consumer and consequently to lower consumption. A tax of one Mexican dollar per case of 10 gallons has recently been imposed on kerosene by the Nanking-Hankow government, effective in Kiangsu, Chekiang, Kiangsi, Hupeh and Anhwei Provinces; this has now been reduced to 60 cents a case for operators signing a special agreement with the government. In South China, American kerosene up to December showed a reasonable recovery from bad conditions, although hampered by piracy and other difficulties, with 2 Canton dollars tax per 10-gallon case.

## CANADIAN COMPANY EXTENDING SYSTEM

CHATHAM, Ontario, Feb. 25.—McColl-Frontenac Oil Co. of Toronto, Ontario, has announced plans for the immediate expansion of its distributing system, both as regards bulk stations and retail depots. New bulk stations are being erected at Kingston, Smith's Falls, Brockville, Cornwall, Parry Sound and Kirkland Lake, Ontario, and pumps are planned for Lansdowne, Milles Roches, Mallorytown, Lancaster, River Beaudette, Iroquois and Cardinal. On completion of these plans the company will have a complete chain of service stations on the highway between Montreal and Toronto. The company has acquired a property at the corner of Monkland and Sherbrooke Streets in Montreal, and is now operating in Western Canada with a filling station at Winnipeg, and is planning a new station for Ottawa.

The 75,000-bbl. tank steamer "Frontenac," recently launched on the Clyde for the McColl-Frontenac Oil Co., is now on the way to the Black Sea for its first cargo. Thence it will return to England, after which it will trade between Texas and Montreal. The company now operates a 7,000-bbl. tanker, the "B. B. McColl," on the Great Lakes between Buffalo and Ontario points.

## Short Talks on Refinery Products

By W. T. Ziegenhain

### HOW GASOLINE IS MADE

In last week's issue of The Oil and Gas Journal a discussion of the blending of straightrun, cracked and natural gasolines included a brief summary of their individual characteristics and in continuation the question might come up as to the difference in processing refinery gasolines to make the various grades. This applies to both the straightrun and cracked gasolines for the ordinary natural gasolines may be blended with the proper grade of refinery gasoline to make any of the standard motor fuels.

The difference in the various refinery gasolines lies principally in the amount of the heavier fractions included. To effect this the distillation of the crude is so controlled as either to allow only the very light fractions to distill over or to allow a great share of these to be included in the gasoline.

As an example, a refiner making a 437-endpoint gasoline would include more of the heavier fractions of the crude than when making a 375-endpoint gasoline. Whereas a yield of 40 per cent of the 437-endpoint gasoline might be derived from a given crude, only about 32 per cent of the 375-endpoint gasoline could be made. The balance or the difference between the 32 per cent and the 40 per cent may either be taken off as naphtha or in some cases is allowed to go to make a high-gravity kerosene. This control is accomplished by controlling the temperatures.

The control of the kind of gasoline to be made is a matter of controlling the distillation temperature. The example of the boiling tea kettle can be used again to advantage in showing how the distillation can be controlled to yield the various gasolines. In the example, however, water boils at a constant temperature while gasoline starts boiling at a relatively low temperature and after the very volatile portion distills off it is necessary to increase the temperature to get the next most volatile fraction to distill off. In this way, if the temperature is set at a given point, only a certain percentage of the crude oil will distill over. But instead of trying to control the temperature of the still within a close range it is more effective to control the temperature of the outlook for the vapors. In the same way, if the spout on the tea kettle could be kept cool, the steam would not be emitted from the kettle but would condense and fall back into the kettle in the same way as the steam condenses on a cold body placed in the path of the steam at the end of the spout. The spout for the still is called a tower and in appearance resembles a small elongated tank set on end. This is filled with plates and other obstructions to slow up the flow of the vapors through the tower to allow an intimate heat exchange. A cooling coil is placed inside the tower near the top and this is the means of keeping the desired temperature. If a light gasoline is to be made, the temperature of the tower must be lower than when making a heavy grade. So when a light grade is to be made, more cold oil or even water is circulated through this cooling coil and the temperature is held down. Likewise, when a heavier gasoline is to be made the amount of cooling is decreased and more of the heavier and less volatile fractions are allowed to distill over.

## BUILDS EIGHTH DOCK

Los Angeles will build its eighth dock for the loading of fuel oil. An agreement has been reached with the Western Oil & Refining Co. whereby the latter will have use of it over a period of five years, payments to be made to the city as rentals and tonnage charges. The new dock will be 305 feet long.

## LUB PLANT FOR GREAT FALLS

The Lincoln Oil Co. of Iowa has purchased a site for a lubricating plant in Great Falls. This plant is to blend lubricating stock and put out a special oil that is suitable for cold climates. The company has a similar plant at Boone, Iowa, and only oil from the Garber Field in Oklahoma is used in the blending process, according to the officials of the company.

## GASOLINE CONSUMPTION GAINS IN DECEMBER

An increase of 11.1 per cent is shown in the December consumption of gasoline compared to that of the same month a year ago, according to the report of the American Petroleum Institute. The actual increase amounts to 46,662,000 gallons. Compared to November the consumption shows a decrease of 14.3 per cent, attributive to the lesser seasonal demand. Based on the consumption figures of 35 states reporting tax collections the total gasoline consumption for the year amounted to an increase of 11.4 per cent over 1926. Following is a list of the consumption figures reported by states based on tax collections:

**Gasoline Consumption by States**
**December, 1927**

| | Month of— Nov., 1927 Gallons | Dec., 1927 Gallons |
|---|---|---|
| Alabama | 13,358,000 | 12,501,000 |
| Arizona | 4,321,000 | 4,521,000 |
| Arkansas | *9,170,000 | 8,216,000 |
| Delaware | 2,167,000 | 1,946,000 |
| Dist. of Columbia | 4,839,000 | 4,750,000 |
| Florida | 19,398,000 | 21,022,000 |
| Georgia | 17,186,000 | 17,035,000 |
| Idaho | 3,565,000 | 2,668,000 |
| Indiana | 33,738,000 | 30,435,000 |
| Iowa | 25,365,000 | 19,530,000 |
| Kansas | 21,512,000 | 19,182,000 |
| Kentucky | *10,384,000 | 9,354,000 |
| Louisiana | 13,414,000 | 13,194,000 |
| Maine | *6,282,000 | 3,842,000 |
| Minnesota | 24,937,000 | 14,515,000 |
| Missouri | 26,694,000 | 24,717,000 |
| Nebraska | 14,478,000 | 12,610,000 |
| Nevada | 1,018,000 | 930,000 |
| New Hampshire | 3,766,000 | 3,253,000 |
| New Mexico | 2,847,000 | 2,551,000 |
| North Carolina | 21,053,000 | 20,503,000 |
| North Dakota | 5,941,000 | 2,290,000 |
| Ohio | 62,730,000 | 58,036,000 |
| Oklahoma | 21,228,000 | 21,525,000 |
| Oregon | *10,291,000 | 9,478,000 |
| Rhode Island | 4,984,000 | 4,736,000 |
| South Carolina | 10,369,000 | 9,055,000 |
| South Dakota | 7,403,000 | 3,841,000 |
| Texas | 54,131,000 | 50,985,000 |
| Utah | 3,151,000 | 2,822,000 |
| Virginia | 14,405,000 | 13,945,000 |
| Washington | 16,252,000 | 14,983,000 |
| West Virginia | 9,026,000 | 7,162,000 |
| Wisconsin | 26,000,000 | 19,136,000 |
| Wyoming | 2,070,000 | 1,738,000 |
| Total | 527,473,000 | 467,016,000 |
| Daily average | 17,582,000 | 15,065,000 |
| Increase over previous year: Amount | ..... | 46,662,000 |
| Percentage | ..... | 11.1% |
| Illinois | 59,805,000 | 55,184,000 |
| New Jersey | 31,752,000 | 30,165,000 |
| Colorado | 10,352,000 | ..... |
| Connecticut | 13,350,000 | ..... |
| Maryland | 10,916,000 | ..... |

| | Quarter Ended— Sept. 30, 1927 | Dec. 31, 1927 |
|---|---|---|
| California | 273,754,000 | 254,778,000 |
| Montana | 18,153,000 | 18,079,000 |
| Pennsylvania | 204,325,000 | 174,657,000 |
| *Tennessee | 43,996,000 | 39,429,000 |

*Revised.

## OIL COMPANY ERECTS AIR BEACON LIGHT

LOS ANGELES, Calif., Feb. 25.—The Standard Oil Co. of California, which has taken a keen interest in the development of aviation on the West Coast, will immediately install a high-intensity, long-range aerial beacon light for the guidance of aviators in southern California. The light will be placed in Merced Hills, just north of Montebello. The California Standard during the past year has made a special study of the motor fuel and lubricating oil requirements of airplanes and has made its products available to aviators in all of the states in which its products are sold.

The new light will have lens and reflector 36 inches in diameter and will develop 10,000,000 candlepower. It is estimated that under favorable conditions a light of this power can be seen by a flyer for more than 100 miles. The site was selected by Lieut. J. P. Warthington of the Department of Commerce. The light will surmount a 75-foot steel tower and will revolve six times per minute. A similar light will be placed on top of Mount Diablo, which overlooks San Francisco Bay.

This 10,000-barrel Butler Bolted Tank was erected in a raging storm in the Church-Fields District.

# Showing Service
## —in storm, in moving and in big tankage

Even if the storm is raging, Butler Bolted Tanks go up. If moving is necessary, Butler Tanks can be moved. If big tankage is needed, Butler Tanks will do the work.

The pictures on this page show these kinds of Butler service!

Speed is one of the urgent services demanded in the oil field and Butler Bolted Tanks answer this demand. And naturally so! Note the following features that aid in speeding erection.

Massive punching machines with tons of pressure pierce all holes in Butler sheets. Accuracy of size and position of holes is assured. This speeds erection.

The *large* Butler sheets also aid in putting up Butler Tanks in quick fashion. There are fewer sheets to handle. There are fewer seams and therefore fewer chances for leaks.

All sheets are made of *blue annealed copper steel* or 3/16" tank plates for added strength and rigidity where needed.

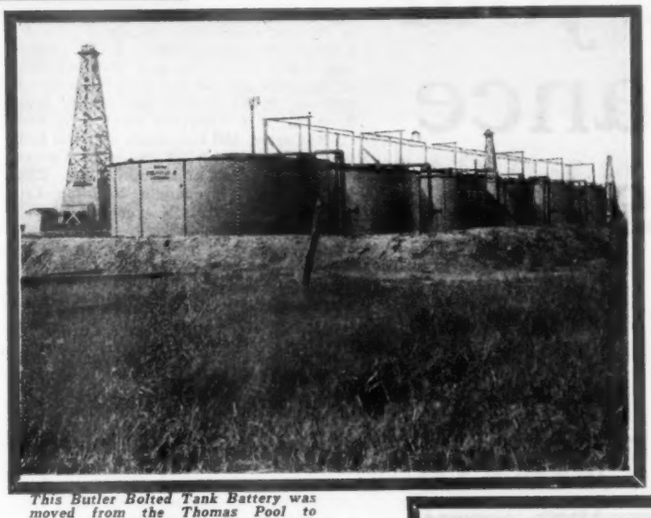
The Butler "Oil Field Tanks" Catalog reveals why Butler Bolted Tanks give such excellent service. Send for a copy today.

*Any kind of welded tank made to your specifications. Also bolted tanks up to 25,000-barrel capacity.*

## Protects *your men!*

The Butler Clean-Out Opening is large—measuring 2'x4'! It is not a back breaker. It is convenient for an entire cleaning out of the tank. Because of the size of this opening the work can be done easily, quickly and more safely.

*All bolts are removable from the outside!*



This Butler Bolted Tank Battery was moved from the Thomas Pool to Hubbard, Oklahoma. (8 miles.)

*Butler Products include: Ready-Made Steel Buildings, Cans, Funnels, Buckets, Measuring Pumps, Truck Tanks, Underground Tanks, Storage Tanks, Bolted Tanks, etc. Also pipe that can be used as conduit, double well casing or in other ways.*

*These reliable dealers erect Butler Bolted Tanks and are ready to serve you speedily:*

M & V Tank Co. at Wichita Falls, Olney, Nocona, Cross Plains, Albany, Cisco, Isom and Brownwood, Texas.

Drane-Humphrey Co. at San Angelo, Big Lake, Pyote and McCamey, Texas, and Roswell, New Mexico.

Drane Tank Co. at Tulsa, Holdenville, Seminole, Hallett and Shawnee, Oklahoma; Eldorado and Madison, Kansas.

M. A. Trimmer at Blackwell, Oklahoma, and Oxford, Kansas.

Keyes-Butler Tank Co. at Casper and Cody, Wyoming.

Thomas Moran at Oil City, Shreveport and Georgetown, La.

Here are a battery of 10,000-barrel Butler Bolted Tanks, 30 miles out of McCamey, Tex.

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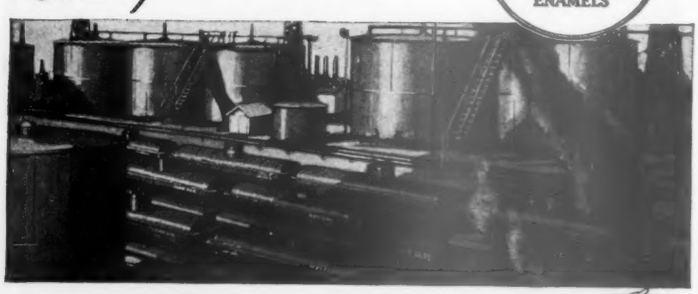

ARCO

[117]

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# NEW LOCATIONS IN TEXAS PANHANDLE AND NORTH AND WEST TEXAS FIELDS

## TEXAS PANHANDLE

### Gray County

Danciger Oil & Refining Co. and others' No. 1 J. S. Morse, 990 feet south and 330 feet west of the NE cor. of the SW of Section 2, Block 26, H.&G.N. Survey.

### Wheeler County

Sabiens Oil Co.'s No. 1 E. L. Woodley, C of SE of SE of Section 21, Block 24, H.&G.N. Survey.

## NORTH CENTRAL AND WEST TEXAS

### Archer County

Burns and Humble Oil & Refining Co.'s No. 1 L. F. Wilson, 150 feet south and east of the NW cor. of Lot 231, Geraldine Subdivision. F. P. Cullum and others' No. 1 Nora Mankins and others, 450 feet south and 929 feet west of the NE cor. of the NE of NW of Section 1, S.P.R.R. Survey, A-427. F. H. Gohlke and others' No. 3 L. F. Wilson, 150 feet north and west of the SE cor. of Lot No. 235, Geraldine Subdivision. Holcombe & Jones' No. 3 J. M. Hawley and Mrs. Childs, 1,250 feet north and 800 feet east of the SW cor. of Section 17, League 3, Denton County School Land, A-117, being 25 feet north and 10 feet west of the SE cor. of Lot No. 3, Block 59, town of Holliday. Same company's No. 2 Kemp & Kell, 1,550 feet north and 800 feet east of the SW cor. of Section 17, League 3, Denton County School Land, A-117, being 25 feet north and 5 feet east of the SW cor. of Lot 8, Block 11, town of Holliday.

Sam Kruger and others' No. 1 W. F. Parrish, 150 feet north and west of the SE cor. of Lot No. 234, Geraldine Subdivision. Consolidated Oil Co.'s No. 1 R. C. Kinder, 150 feet south and west of the NE cor. of the west 40 acres of the north 80 acres of Section 59, Clark & Plumb Subdivision, Block 5. F. P. Cullum and others' No. 1 J. L. Anderson, 1,470 feet south and 150 feet east of the NW cor. of the east 80 acres of Section 19, South Anderson Ranch Subdivision. P. F. Gwynn's No. 1 E. R. and C. B. Carter, 150 feet south and 450 feet west of the NE cor. of the east 40 acres of the south half of Section 1,594, T.E. &L. Survey. Panhandle Refining Co. and Hines' No. 1 R. M. Peeler, 200 feet south and 250 feet west of the NE cor. of the east 36 acres of the south 96 acres of Section 25, Club Ranch Subdivision.

### Brown County

D. Breeding and others' No. 1 Roy Hickman, 2,500 feet south and 3,075 feet west of the NE cor. of the T. Benson Survey No. 783, being 150 feet south and 75 feet east of the NW cor. of their nine-acre lease. Cen-Tex Refining Co.'s No. 3 H. L. Allcorn, 200 feet north of the south line and 200 feet west of the east line of the H. L. Allcorn 110-acre tract out of the Roland Honeycutt Survey No. 623. Clark-Buffalo Oil Co.'s No. 1 Brown County, 1,800 feet south and 2,250 feet east of the NW corner of the J. Kenny Survey, No. 624. Gilman & McMurray's No. 3 Roy Hickman, 150 feet north and 460 feet east of the SW corner of their lease out of the T. Benson Survey, No. 783. Gilman & McMurray's No. 1 Roy Hickman-A, 2,205 feet south and 4,100 feet west of the NE corner of the T. Benson Survey, No. 783, being 150 feet north and 140 feet west of the SE corner of their 26.61-acre "A" lease.

W. M. Mitchell's No. 2 Fannie Allcorn, 200 feet north of the south line and 150 feet east of the west line of the F. Allcorn 100-acre tract out of the R. Honeycutt Survey, No. 623. Pandem Oil Corp.'s No. 5 A. L. Curry-B, 150 feet north and west of the SE corner of the south 20 acres of the north 40 acres of the west 80 acres of the E. L. Betts Survey, A-70. Same corporation's No. 4 A. D. Hutton, 150 feet north and 165 feet east of the SW corner of the west 20 acres of the north 40 acres of the J. A. Nobles Survey, A-1,947. Same corporation's No. 1 C. A. Thomason, 150 feet north and 1,336 feet east of the most northerly SW corner of the C. A. Thomason 261-acre tract out of the J. J. Clelland Survey, No. 64.

Phillips Petroleum Co.'s No. 7 Roy Hickman, 183 feet south and 150 feet west of the NE corner of its lease out of the T. Benson Survey, No. 783. M. L. Richards' No. 1 A. D. Hutton, 150 feet north and west of the SE corner of the west 20 acres of the south 40 acres of the J. A. Nobles Survey, A-1,947. Shuler & Davies' No. 2 B. S. Boysen, 150 feet south and west of the NE corner of the south 40 acres of the north 80 acres of the H. Pressler Survey, A-2,041. Syndicate Oil Co.'s No. 3 A. L. Curry, 150 feet south and west of the NE corner of the south 40 acres of the west 80 acres of the A. L. Curry 100-acre tract out of the E. L. Betts Survey, A-70.

Van Bibber & Lehman's No. 6 A. C. Evans, 750 feet north and 1,726 feet east of the SW corner of the A. C. Evans 106.5-acre tract out of the James Woodward Survey, No. 20, A-964. Bush & Spinney's No. 2 J. L. Richardson, 550 feet north and 1,075 feet east of the SW corner of the S.A.&M.G. Survey, A-1,233. Denninger and others' No. 1 R. A. Smith, 2,850 feet northwest of the southeast line and 9,750 feet northeast of the southwest line of the J. S. Thom Survey, A-897, being 150 feet each way out of the most westerly north corner of the R. A. Smith tract.

### Clay County

Lone Star Gas Co.'s No. 26 E. L. Holloway, 200 feet north and east of the SW corner of the E half of Section 50, Parker County School Land, A-374. Comac Oil Co.'s No. 1 W. J. Hawthorne, 2,490 feet south and 1,170 feet west of the NE corner of the Charles F. Stanley Survey, A-407.

### Callahan County

H. V. House and others' No. 1 W. D. Clinton, 150 feet north and west of the SE cor. of the NW of the SW of Section 15, Bayland Orphan Asylum Land. Kingwood Oil Co.'s No. 1 J. H. Sharry, 330 feet north and west of the SE cor. of Section 23, Victoria County School Land.

### Coleman County

Empire Gas & Fuel Co. and others' No. 1 J. Fox Casey, 800 feet south and 2,250 feet east of the NW cor. of the T.&N.O. Survey No. 45, A-668.

### Cooke County

W. J. Green and others' No. 3 Louise Campbell, 500 feet north and 1,050 feet east of the SW cor. of the L. Campbell tract out of the O. F. Leverett Survey, A-607.

### Crockett County

M. B. Wyrick and others' No. 1 H. M. Falff, 150 feet south and 1,322 feet east of the NW cor. of Section 68, Block 1, H.&G.N. Survey.

### Eastland County

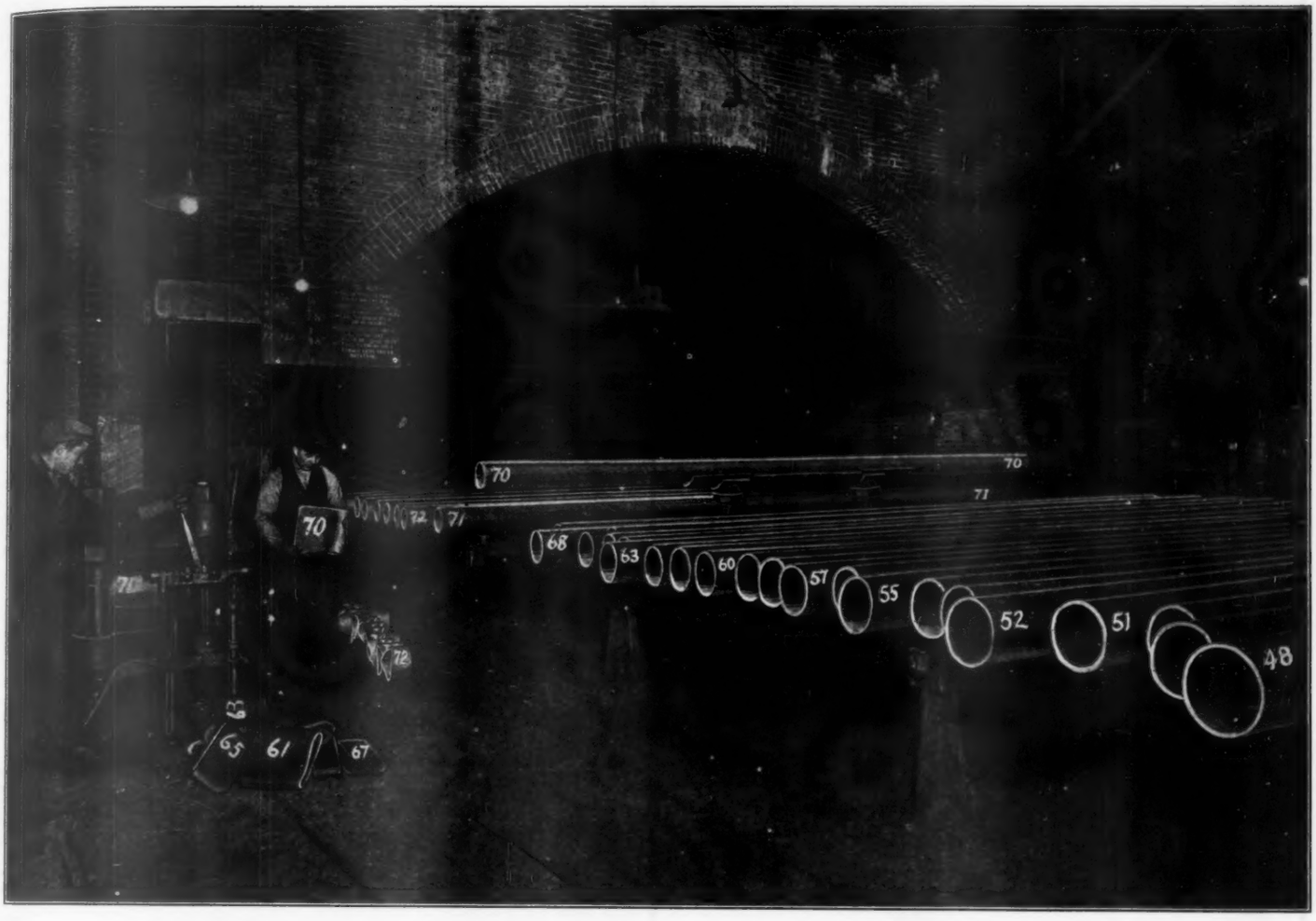
Goodwin and others' No. 1 J. V. Parker, 6,000 feet north and 6,400 feet east of the SW cor. of the William Norman Survey, being 300 feet north and 480 feet west of the SE cor. of the J. V. Parker 50-acre tract. Schimmell Production Corp.'s No. 1 H. C. Earnest, 700 feet south and 150 feet west of the NE cor. of the NW of Section 3, Block 4, H. &T.C. S. A. Hopkins and others' No. 1 N. H. Jones, 250 feet north and 1,450 feet east of the SW cor. of the north 133 acres of the NE of Section 43, Block 4, H.&T.C.R.R. Survey.

### Foard County

Fain-McGaha Oil Corp. and others' No. 2 J. F. Mathews, 900 feet north and 450 feet east of the SW cor. of the east 80 acres of the north 160 acres of the south 320 acres of Section 3, G.C.&S.F. R.R. Survey, A-117.

### Haskell County

Edmiston & Critton's No. 2 Reynolds Cattle Co., C of N half of SE of Section 94, E. A. Rose, Survey, A-946. Phillips Petroleum Co.'s No. 1 G. Moeller, midway north and south and 1,650 feet west

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Every length of Chester Casing, Pipe and Tubing must pass the Crop-End Test. Both crop ends are crushed and examined as an additional important physical test to check the character of weld and metal of each length of pipe.

By the system of duplicate numbers on pipe and crop ends, identity is immediately established. Rejects are returned to the mill for retesting or rejection.

The usual method of testing and checking heavy duty material is to take a small percentage of the number of pieces for test purposes. South Chester Tube Co. goes to the extreme of making two tests of each length which represents a 200% check. This is but one of the means Chester employs to insure 100% satisfaction in its product. The wide use of Chester Products is evidence that the value of these tests is appreciated by the trade.

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Also makers of Wrought Iron Casing from 4½" to 12½"

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Line Pipe, up to 5 inches.
Refinery Piping, 1-in. to 5-in.
Bailer Tubing
Still Tubes, Upset or Plain
Tank Car Piping
Boiler Tubes
Tubular Structural Material
Special Tubing

Special attention is called to the Seamless Steel Pipe (iron pipe sizes 1-in. to 5-in.) offered by this company. The same advantages of seamless steel which have led to the widespread adoption of this material for oil well tubing, high-pressure boiler tubes and still tubes, are now available for various piping installations.

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DALLAS
Magnolia Building

SAN ANTONIO
511 Builders Exch. Bldg.

GALVESTON
414 Security Bldg.

AMARILLO
222 Amarillo Bldg.


of the east line of the J. Mathis Survey, A-981.

**Jack County**

Hammon & Garrett's No. 1 G. C. Booth, 150 feet north and 2,200 feet west of the SE cor. of the south 480 acres of the G. O. Booth 640-acre tract out of Section 1, W.C.R.R. Survey, A-909. W. H. Kerbow and others' No. 1 L. O. Gowdy, 150 feet southeast of the northwest line and 150 feet northeast of the southwest line of the E.P.I. Survey, A-204. Measure & Fondrew's No 1 R. H. Massie, 1,000 feet south and 150 feet east of the NW cor. of the John Holderman Survey, A-267. J. T. Owens and others' No. 1 Sarah Wilson, 4,250 feet north and 2,250 feet east of the SW cor. of the E. Smith Survey, A-524. Shaw Oil Co.'s No. 8 J. W. Cullers and others, 400 feet north and 700 feet west of the most easterly SE cor. of their 80-acre lease out of Section 4, S.P.R.R. Survey, A-2,188.

**Montague County**

Bridwell & Heydrick's No. 4 Mrs. M. H. Salmon-A, 450 feet south and east of the NW cor. of their 62-acre lease "A," out of the F. Robertson Survey, A-620.

**Pecos County**

Mid-Kansas Oil & Gas Co.'s No. 14 Smith-Taylor, 708 feet south and 1,262 feet east of the NW cor. of Section 33, Block 194, G.C.&S.F. Survey. Gulf Production Co.'s No. 8 I. G. Yates, 4,160 feet north and 4,110 feet east of the SW cor. of Runnels County School Land, A-2169. Stidham & Thrasher's No. 1 Belgrade Ranch Company, 2,640 feet north and 3,300 feet east of the SW cor. of the Mrs. S. Tompkins Survey No. 3, A-4,695.

**Reagan County**

Marland Oil Co.'s No. 1 University Land, 330 feet north and west of the SE cor. SW, Section 26, Block 8, University Land. The California Co.'s No. 4 University Land, 330 feet south and east of the NW cor. of Section 3, Block 7, University Land.

**Terrel County**

Wooley & Jones' No. 1 Pankenham, C of SE of NW of Section 43, Block B-2, C.C.S.D.&R.G.N.G.R.R. Survey.

**Ward County**

Alfredo Del Cambre's No. 1 Lee Monroe, 2,640 feet southwest of the northeast line and 150 feet southeast of the northwest line of Section 50, Block 33, H.&T.C Survey. E. H. Devore and others' No. 1 Black, 2,490 feet southeast of the northwest line and 2,490 feet southwest of the northeast line of Section 214, Block 34, H.&T.C. Survey.

**Wichita County**

C. H. Clark and others' No. 6 W. T. Waggoner, 1,090 feet south and 800 feet west of the NE cor. of Section 33, Block 5, H T.&B. Survey, A-108. Perkins & Cullum's No. 9 Beaver Electra Royalty and others', 150 feet north and 835 feet east of the SW cor. of their 33-acre lease out of Section 11, H.T.&B. Survey, A-136. A. T. Wolfe & Grayce Oil Co.'s No. 4 E. Daume, 1,450 feet north and 150 feet west of the SE cor. of the north half of Section 1, S.P.R.R. Survey, A-266.

**Wilbarger County**

C. W. Boller's No. 1 W. T. Waggoner, 200 feet north and east of the SW cor. of the NW of the NE of Section 27, Block 4, H.&T.C Survey. C. P. Burton and Humble Oil & Refining Co.'s No. 1 W. T. Waggoner, 150 feet south and 450 feet west of the NE cor. of the north 160 acres of the Thomas D. Purnell Survey. Fain-McGaha Oil Corp.'s No. 3 W. T. Waggoner-M, 150 feet north and 505 feet west of the SE cor. of the SW of the SW of Section 24, Block 4, H.&T.C. Survey. Same corporation's No 1-A W. T. Waggoner-O, 205 feet north and 805 feet west of the SE cor. of the NW of the NW of Section 50, Block 4, H.&T.C. Survey. Milham Corp.'s No. 18 W. T. Waggoner-B, 1,915 feet south and 150 feet west of the NE cor. of its "B" lease out of Section 31, Block 4, H.&T.C. Survey. The Texas Company's No. 8 W. T. Waggoner-B, 205 feet south and east of the NW cor. of the NE of Section 16, Block 4, H &T.C. Survey.

**Winkler County**

Atlantic Oil Producing Co.'s No. 3 Ida Hendricks-D, 1,650 feet south and east of the NW cor. of Section 29, Block B-5, School Land. Same company's No. 4 Ida Hendrick-D, 1,650 feet south and 990 feet east of the NW cor. of Section 29, Block B-5, School Land. Gulf Production Co.'s No. 15 T. G. Hendrick, Tract C, 990 feet north and 330 feet east of the SW cor. of the NW of Section 40, Block B-5, School Land. Humble Oil & Refining Co.'s No. 5 Ida Hendrick-B, 2,310 feet north and 990 feet west of the SE cor. of Section 29, Block B-5, School Land. Same company's No. 6 Ida Hendrick-B, 2,310 feet north and 1,650 feet west of the SE cor. of Section 29, Block B-5, School Land. Southern Crude Oil Purchasing Co.'s No. 2 Ida Hendrick, T-67-A, 2,310 feet north and 330 feet west of the SE cor. of Section 42, Block B-5, School Land. Southern Crude Oil Purchasing Co.'s No. 1 Ida Hendrick, T-67-E, 2,310 feet south and 330 feet west of the NE cor. of Section 42, Block B-5, School Land.

**Young County**

Allday Oil Corp.'s No. 2 C. W. Johnson, 450 feet north and 150 feet east of the SW cor. of Lot No. 14, E. W. Sergeant Survey, A-253. Benson Oil Co.'s No. 1 S. M. J. Benson, 150 feet north and 750 feet east of the SW cor. of Section 1,392, T.E.&L. Survey. H. C. Donohoo & Atlantic Oil Producing Co.'s No. 1 Booth Furr, 150 feet north and west of the SE cor. of the NW of Section 320, T.E.&L. Survey. Parker and others' No. 1 C. F. Newman, 150 feet north and 750 feet west of the most easterly SE cor. of the S. Sallie Survey, A252. T. E. Seigler's No. 1 J. C. Bloodworth, 150 feet north and west of the SE cor. W half W half Section 214, T.E.&L. Survey. D. L. Wolf and others' No. 2 J. T. Lowe, 450 feet north and 750 feet east of the SW cor. S half NW of Section 59, T.E.&L. Survey.

**Corrected Locations**

Archer County: Holcombe & Jones No. 1 Kemp & Kell, 1,460 feet north and 550 feet east of the SW cor. of Section 17, League 3, Denton County School Land, A-117, being 25 feet north and 3 feet west of the SE cor. of Lot No. 9, Block 58, town of Holliday. Same company's No. 1 J. M. Hawley and Mrs. Childs, 1,050 feet nort hand 250 feet east of the SW cor. of Section 17, League 3, Denton County School Land, A-117, being 25 feet north and 115 feet east of the SW cor of Lot No. 10, Block 80, town of Holliday. Same company's No. 2 J. M. Hawley and Mrs. Childs, 1,200 feet north and 550 feet east of the SW cor. of Section 17, League 3, Denton County School Land, A-117, being 25 feet north and 50 feet east of the SW cor. of Lot No. 10, Block 59, town of Holliday.

Brown County: Gilman & McMurray's No. 2 Roy Hickman, 2,175 feet south and 3,800 feet west of the NE cor. of the Thomas Benson Survey No. 783, being 180 feet north and 160 feet east of the SW cor. of their lease.

Eastland County: Mook-Texas Oil Co.'s No. 2 U. Casey-A, 375 feet south and 900 feet west of the NW cor. of Lot No. 17 and located on U. Casey 253-acre tract out of William Van Norman Survey. Same company's No. 1 U. Casey-B, 1,840 feet north and 1,220 feet east of the SW cor. of the U. Casey 253-acre tract out of the W. Van Norman Survey.

Stephens County: Six hundred and fifty feet north and 1,200 feet east of the SW cor. N half Section 458, S.P.R.R. Survey.

Winkler County: Independent Oil & Gas Co.'s No. 5 Grisham-Hunter-B, 1,650 feet south and east of the NW cor. of Section 41, Block B-5, School Land.

Young County: Robert Oil Corp.'s No. 1 J. K. Thomas, 450 feet north and 509 feet west of the SE cor. of Section 155, T.E.&L. Survey.

## COMPLETES CONCRETE TANK

HOUSTON, Tex., Feb. 20.—Shell Pipe Line Co. has completed a 1,000,000-bbl. earthen storage tank in Ward County, West Texas. The tank was built at a cost of $225,000. It is 504 feet wide, 505 feet long, 36 feet deep in the center and 26 feet deep at the edges.

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# It has a good hang

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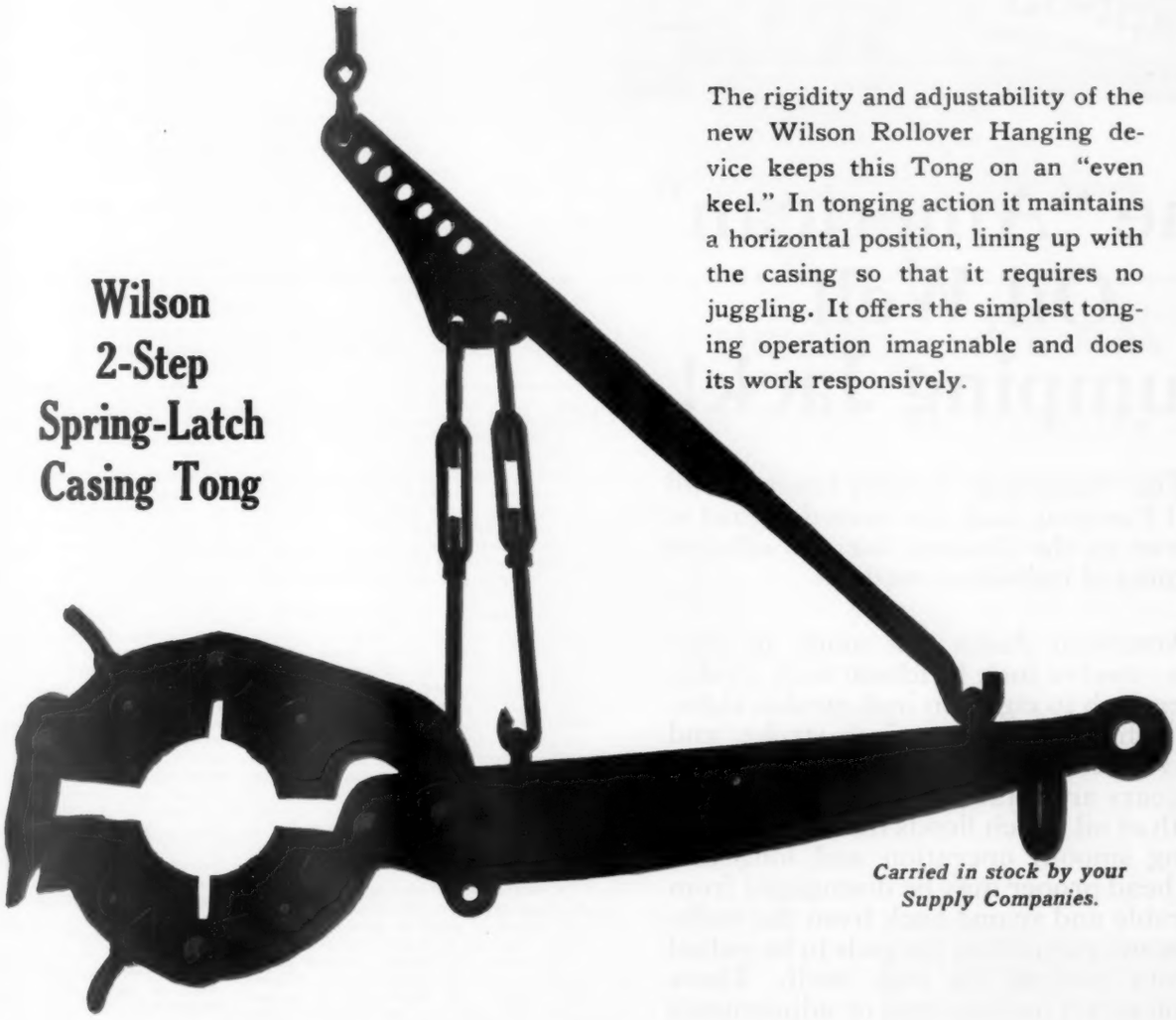
2-Step
Spring-Latch
Casing Tong



The rigidity and adjustability of the new Wilson Rollover Hanging device keeps this Tong on an "even keel." In tonging action it maintains a horizontal position, lining up with the casing so that it requires no juggling. It offers the simplest tonging operation imaginable and does its work responsively.

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**The "American" Totally Enclosed Oil Well Pumping Jack has been designed in answer to the demand for the efficient pumping of individual wells.**

**American Jacks are made in four sizes—twelve inch to fifteen inch stroke, fifteen inch to eighteen inch stroke, eighteen inch to twenty-two inch stroke, and thirty inch to thirty-six inch stroke. All gears are totally enclosed and run in a bath of oil which floods the bearings, insuring smooth operation and long life. The head proper may be disengaged from the cable and swung back from the walking beam, permitting the rods to be pulled without moving the jack itself. There are no screw mechanisms or adjustments necessary. No gears are exposed.**

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# REPORTED PROPOSAL TO DIVIDE COUNTRY INTO THREE OIL DISTRICTS

By N. O. Fanning

*New York Bureau, The Oil and Gas Journal, Room 629, No. 101 Park Avenue, New York, N. Y.*

NEW YORK, Feb. 27.—The division of the United States into three sections according to producing areas and markets to be supplied by each is understood to be one recommendation under consideration by the Federal Oil Conservation Board, with the view of preserving the balance between supply and demand in each section and preventing an oversupply in one section from upsetting the economic balance in the other sections.

The fundamental basis of this division would be the arbitrary or enforced shutting in of excess production, probably by Federal or State legislation, in each area, and preventing the flooding of uneconomic production into one section from another in which overproduction exists. Of course the transfer of oil would not be hindered if in accordance with strictly economical considerations.

The three areas of consumption and producing areas which are to supply them, according to the proposed division, are:

1. The Atlantic Seaboard, to be supplied foreign fields, including Colombia and Venezuela.

2. The Central States and Rocky Mountain District, to be supplied from the Mid-Continent, Gulf Coast and Rocky Mountain fields.

3. The Pacific Coast, to be supplied by the California fields.

That these divisions take into consideration possibilities which may materialize more or less in the distant future is evident, yet it emphasizes the far-sighted viewpoint taken in the matter of the study now under way on which future legislation may be based.

It is reported that sentiment on the Pacific Coast, particularly, is strongly against the shipment of oil in large quantities through the Panama Canal to eastern markets, on the ground that the present excess will be required on the Coast in the future. The present movement is in excess of 50,000 bbls. a day, and it has exceeded a rate of 100,000 bbls. a day in the past.

The production of the Mid-Continent, Gulf Coast and Rocky Mountain Fields is now in excess of the needs of the Central and Rocky Mountain States. Under the proposed division, all the excess would be shut in except that actually required on the Atlantic Seaboard as a result of a shortage of imported crude.

The Atlantic Seaboard, considered the logical market for Colombian and Venezuelan crude, could not be supplied in full by the production of these and adjacent countries at present, but the Mid-Continent would make up the difference meanwhile.

Allowance would also have to be made to some extent for the demand for special grades of crude in demand in areas where that grade is not produced.

The export field would continue to be supplied from the various coast refineries, without any discrimination as between the divisions, but exports, under recommendations which are expected to be made, would be restricted if not in the best interests of the country, proportionately in the different divisions.

### Anticipating Future

The proposed divisions represent, in the view of several oil men who believe the proposition sound, an anticipation of conditions which slowly are coming about in a natural way, but with a great deal of unnecessary suffering to the oil business. The rapid increase in production in Venezuela and the vast potentialities of Colombia and some other adjacent fields cannot be ignored, in their opinion, and should be met in such a way as to avoid uneconomic dumping of imported oil on the America nmarkets. The Atlantic Seaboard is regarded by them as a logical market for much of the oil to be produced in these countries, much more so, for instance, than for California oil.

So far as the situation in the other two divisions is concerned, the increasing demand for petroleum products, it is believed, would ultimately require the full production of oil in their respective sections, including that amount which had been shut in pending a home demand.

The movement of oil as between these three proposed divisions at present is, roughly, as follows (daily averages):

| | Bbls. |
|---|---|
| Atlantic seaboard: | |
| Imported | 150,000 |
| From Southwest | 500,000 |
| From Pacific Coast | 50,000 |
| Southwest: | |
| Imported | 75,000 |

The ultimate goal of the proposed recommendation is to have the Atlantic seaboard import as nearly as possible all of the 700,000 bbls. required from outside sources, and to receive from the Southwest only that amount which can economically be transferred to the advantage of both divisions.

The Southwest would import only that amount of oil required to make up its own deficiency, if there were any.

Instead of oil being sent from the Pacific to the Atlantic, the excess production in California would be shut in awaiting the extension of the Pacific Coast markets.

### New Machinery Required

The carrying out of such a recommendation would naturally require an entirely new conception of legal rights. It would involve the modification of the antitrust laws, both federal and state, and would also require the passing of new laws to fit the case. It is believed, however, that many of the oil-producing states would be willing to fall in line to conserve their production for nearby or home markets.

From a physical viewpoint, the scheme, in the opinion of those sponsoring it, would involve no loss of present capital investment, but would only necessitate restricting production, where necessary, on an equitable basis.

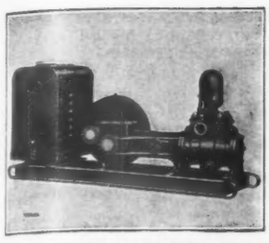
The scheme is also believed to be compatible with the recommendations of the Committee of Nine, recently published, that legislation be enacted, providing (a) that during a period of overproduction, or in immediate anticipation of one, agreements curtailing the development and production of oil shall not be in violation of the laws, state or federal, forbidding restraints on competition; (b) that a period of overproduction permitting of such agreements be deemed to exist only when so declared by suitable governmental authority, and be deemed to end when that fact is similarly declared; (c) that all such agreements be subject to supervision by suitable governmental authority, be filed with it as a condition of their legality, and do not become effective until they are so filed; and (d) that the supervising authority has the right to abrogate any agreements filed which for any reason it judges not to be in the public interest.

The plan of dividing the country into three sections and the determination of when or under what exact conditions transfers of oil would be allowed or encouraged is one which would require considerable machinery of administration, it is admitted, but the results would justify the effort, sponsors of the plan believe. It is also pointed out by them that any plan which has been suggested so far would require special machinery in the way of personnel, and this particular plan would probably not require duplication.

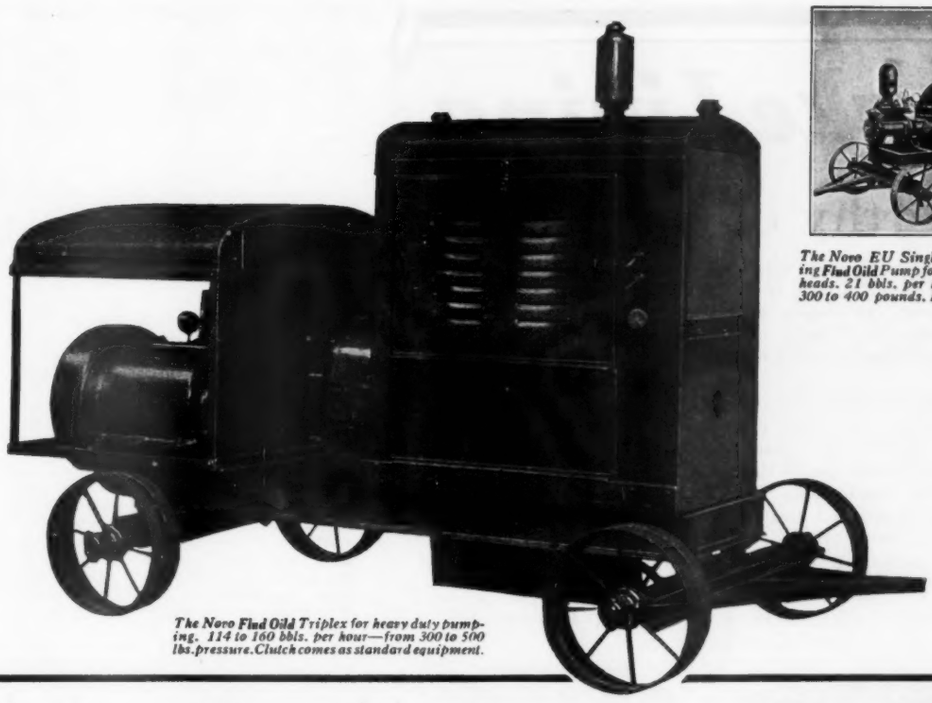
## CENTRAL WEST FIELDS

(Continued from Page 68)

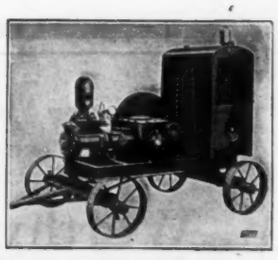
always looked upon as worthless for oil production until the Saginaw Field was opened over two years ago. The only producing well out of two tries in the Muskegon Field, was that of the Muskegon Oil Corp. This company has a third test on the Fred W. Figge property, Section 9, Muskegon Township, close up to the producer now reported making around 00 bbls. daily. The top limestone cap in No. 3 was found at 1,627 feet, 2 feet lower



*The Novo EW Duplex Flud Oild double acting Pressure Pump—for either oil or water. 50 to 160 bbls. per hour, up to 400 pounds pressure. Clutch comes as standard equipment on outfits powered with 4-cylinder engines. Equipped with spring loaded valves when ordered for oil pumping.*



*The Novo Flud Oild Triplex for heavy duty pumping. 114 to 160 bbls. per hour—from 300 to 500 lbs. pressure. Clutch comes as standard equipment.*



*The Novo EU Single Cylinder, double acting Flud Oild Pump for handling water at high heads. 21 bbls. per hour at pressures from 300 to 400 pounds. Has hydraulic packing.*

# New Trouble-Free Portable Pumping—Out Where Trouble-Free Pumping Means Economy

In the New Novo Flud Oild Series you have three new Portable pressure pumps that give an unbelievable freedom from care, trouble, and high costs—pumps that can handle any capacity from 21 to 160 barrels per hour over any distance from 10 feet to 10 miles.

New Flud Oild Lubrication guards every gear, every crosshead—holds the hazards of wear and the power wastes of friction reduced to a minimum. And it virtually guarantees longer-lived pumping ability and far lower costs.

Because of this constant, thorough, unfailing lubrication, you can start a Novo Pump and practically forget it. The only attention it requires is an occasional inspection to see that the oil is kept at the proper level. It keeps a never-ending supply of water coming to your steam rig. And when used for oil gathering, the EW Duplex keeps the gathering pipes busy *every* minute it is in operation.

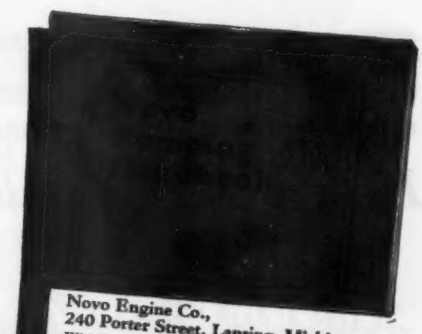
**Flud Oild**

The cover of the *dirt-proof* case has been removed to show you the crankshaft, bearings, gear, and pinion of the new Novo NT Triplex Pump—and the new Flud Oild lubricating system. This is the most advanced method of oiling heavy duty pressure pumps.

Two oil dippers (only one is shown) pick up the oil from the bottom of the crank case and throw it in flood-like streams into the reservoir under the intermediate shaft and pinion. Large ducts carry oil to the bearings, crossheads, and connecting rod ends. And the large crankshaft gear runs in oil at the bottom of crank case.

*Every moving part is constantly, thoroughly flooded with oil.* Every possibility of excessive, devastating wear is entirely eliminated.

The coupon below will bring you detailed information on the new Flud Oild Series and a copy of the new Novo Pumping Handbook that shows what Novo Pumps are doing in every type of work. *Send it today.*



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**Tough as the asbestos from which it is made. Sturdy as the brakes it lines. Strong, effective and able to withstand heavy duty service day-in-and-day-out. Here is a *real* brake lining, built in such a way that it wears and works under the most difficult conditions. Thickness micrometrically accurate. Readily applied and easily adjusted. Economical because of very long life.**

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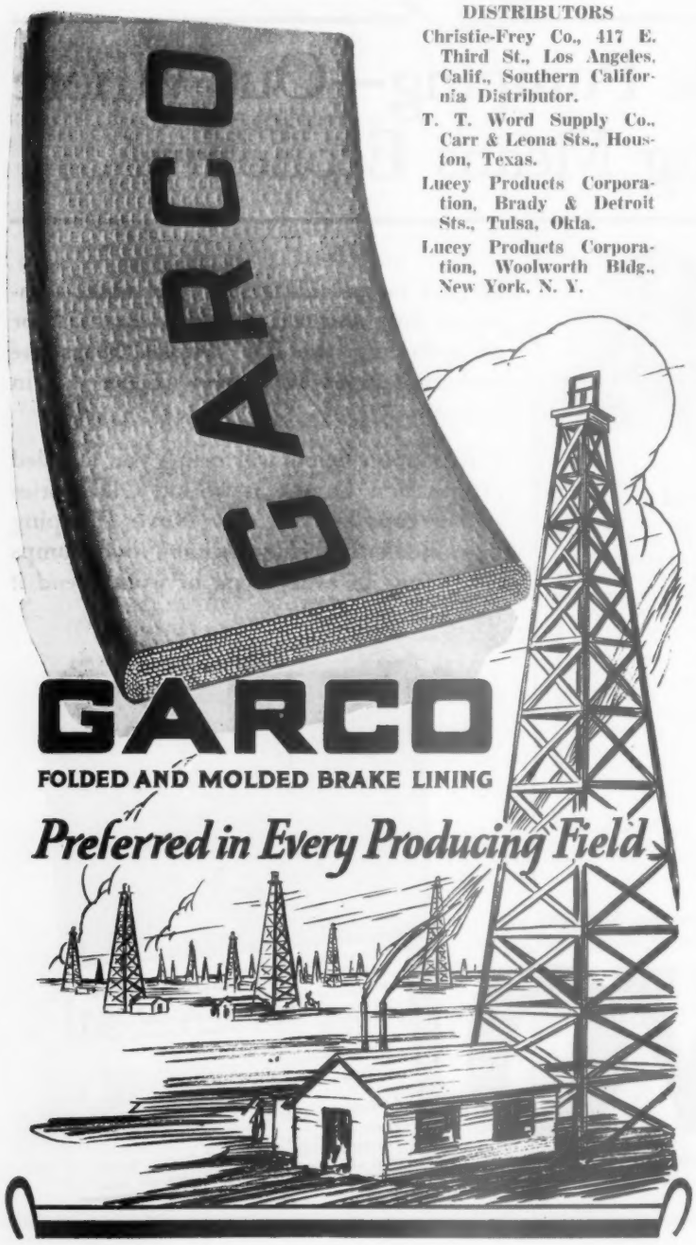



than in the oil well, and expectations are that the oil sand will be found close around 1,660 feet, but may vary some. A small show of gas was struck in the limestone cap at 1,640 feet. Everything is ready to care for the oil at the Figge well, should it blow in, the control head being placed and four tanks are ready to be hooked up when needed.

Four other wells are drilling in the prospective field and 8 additional rigs are being set up. The four rigs drilling include a rotary rig of the Bulldog Oil & Gas Co. on the Charles I. Giles property in Section 6; Hagan & Hagan, contractors, are drilling for the Johnson Oil Refining Co. on the Joseph Cihak property in Section 3; Gray Well Drilling Co., Chicago and Milwaukee contractors, are drilling on the Becker brothers property in Section 4 for the Citizens Petroleum Co., a subsidiary of the Muskegon Oil Corp., and C. M. Bowers drilling for himself on the Smith property in Section 3.

### New Rigs

Other companies which are now setting up new rigs in the field are: The Maire-Caswell company, on the Margaret Figge property in Section 9, a few hundred feet southeast of the discovery well; J. B. Reed, contractor, on the property of George H. Shoup, in Section 8; the Lake Shore Petroleum Co., another subsidiary of the Muskegon Oil Corp., on the Torrent estate in Section 9, southwest of the discovery well; J. B. Reed, also on the Torrent estate on the Muskegon River flats in Section 8; Charles Brandt, in Section 4, northwest of the discovery well; William P. Bradley, in Section 4, directly north of the discovery well, and a local syndicate headed by Glenn M. Porter, Muskegon, on the Marquardt property in North Muskegon, Section 7.

C. M. Bowers, of Detroit, an independent operator, has a rig about ready to drill on property near the first well of the Johnson Oil Refining Co.

V. M. Vorhees, Saginaw contractor, is preparing to drill for a local syndicate in the northwest quarter of Section 8, less than a mile from the discovery well.

A drilling outfit is being shipped from Cleveland, Ohio, by A. S. Cochran for drilling a test on the A. R. Taggart farm, in the SE SE, Section 5, Muskegon Township.

County register of deeds of Muskegon County is now having his hands full recording the many leases that are left at his office daily. Stacks of them have been filed in the past few weeks. Leasing is being done in most all parts of Muskegon County.

The Sun Oil Co. of Toledo, Ohio, has secured large blocks of acreage in Dalton, Laketon and Fruitland Townships, Muskegon County, and leases are being taken in Cedar Creek, Holton, Muskegon and other townships of the county. At Montague, in the northwestern part of Muskegon County and close to Lake Michigan, a block of 3,000 acres has been taken under lease by the Montague Oil Co., of which Dwight M. Davis is the head, the leases being to the north of that town. Mr. Davis is from Montague, La., and owns some wells in that State and concluded to try his luck near Montague, Mich. He expects to start operations early in May.

Among the other companies securing blocks of acreage are the Ohio Oil Co., Pure Oil Co., Dixie Oil Co., Cardinal Petroleum Co. and others.

Plans already have been made by the Muskegon Oil Corp. to move the rig now completing its No. 3 to the property of Albert Heinz immediately adjoining its present location on the west. It was also announced that the Joliet Petroleum Co. will drill on the Nichols property in the same section. This is a third subsidiary of the parent corporation.

Leases are being taken on large tracts in Oceana, Newaygo and Kent Counties which bound Muskegon County on the north and east. A few leases also have been filed in Ottawa County south of Muskegon.

### State Geologist's View

R. A. Smith, State geologist, who visited the Muskegon field for the first time since wildcat drilling was started here nearly a year ago, cautioned against over-enthusiasm with regard to the possibilities but reiterated his belief that somewhere in Michigan there would be found a very profitable field or pool in the Traverse formation.

"The Traverse formation is a very tricky one and this first well may have struck only a pocket pool under 40 acres or so of ground," stated Mr. Smith. "Whether it will be the sizable pool I believe some day will be found in Michigan, only another two months of drilling can establish."

The Sun Oil Co. is starting a well on the S. S. Menter farm, Section 22, Elba Township, Gratiot County, and is an offset to the company's No. 1 on the Horrie farm, which is said to be holding at 20 bbls. daily.

## NEW POOLS ARE BEING FOUND ON GULF COAST

(Continued from Page 42)

into every part of the coastal territory and into Mississippi and Alabama.

### Eight Domes Found in 1927

During 1927, eight new domes were located by geophysical operations. These were all in one group within a radius of from 50 to 60 miles in lower central Louisiana and are estimated to have added approximately 30 to 40 per cent to the potential oil reserve of Louisiana coastal territory.

Included in this group was the Sorrento Dome on which the Gulf Refining Co. has just made its first oil discovery. Another of these new domes, Darrow, in Ascension Parish, also is east of the Mississippi River. These two are the only known domes east of the river. The latter also was a Gulf Refining Co. discovery.

Other new domes in this group include Lutcher, LaFourche Parish, and Grassette, Baton Rouge Parish, also Gulf discoveries; Bayou Blue, Iberville Parish, held by the Union Sulphur Co.; Bayou Henry and Bayou Des Glais, Iberville Parish, held by the Union Sulphur Co. and the Standard Oil Co. of Louisiana and White Castle, Iberville Parish, owned by the Roxana Petroleum Corp.

Two other domes, within the same radius with these eight 1927 discoveries were located during the latter part of 1926. The Napoleonville Dome was located by seismograph work in November of 1926, and in December of the same year the presence of dome material was proved in a test drilled by the Union Sulphur Co., when it drilled into cap rock at 450 feet. The Feussa Point Dome, 6 miles east of Loreauville, Iberia Parish, was another late 1926 discovery. This was located with the seismograph by the Gulf Refining Co. and later in November, 1926, the Union Sulphur Co. proved it by drilling a test into salt at 1,394 feet.

As previously mentioned, oil already has been tapped on the latter dome, the discovery well, a 600-bbl. producer, being drilled by the Gulf Refining Co. to a sand at 1,100-80 feet.

Louisiana Land & Exploration Co. has just proved the existence of another dome in Iberia Parish, 3 miles southwest of Cypremont Point and 25 miles southwest of Franklin, where it drilled into salt at 800 feet. The dome is in Vermillion Bay.

### White Castle in Limelight

White Castle, Iberville Parish, one of the newest domes, has been in the limelight so far this year. Roxana's first test there encountered a sand showing very rich in oil at 1,580-89 feet. The test, however, bailed salt water and has been deepened to 1,700 feet where it tested sulphur and salt water the past week. It is to be deepened.

The Terrebonne Dome, the most southerly known dome in the State and in the marshes of Terrebonne Parish, is a prospect but so far has yielded only gas. Southern Gas Co. has been drilling on this dome for some time and at present has a test under way.

The Jefferson Island Dome, Iberia Parish, a prospect known since 1904, has been pretty well defined by tests which have been drilled on all sides except the

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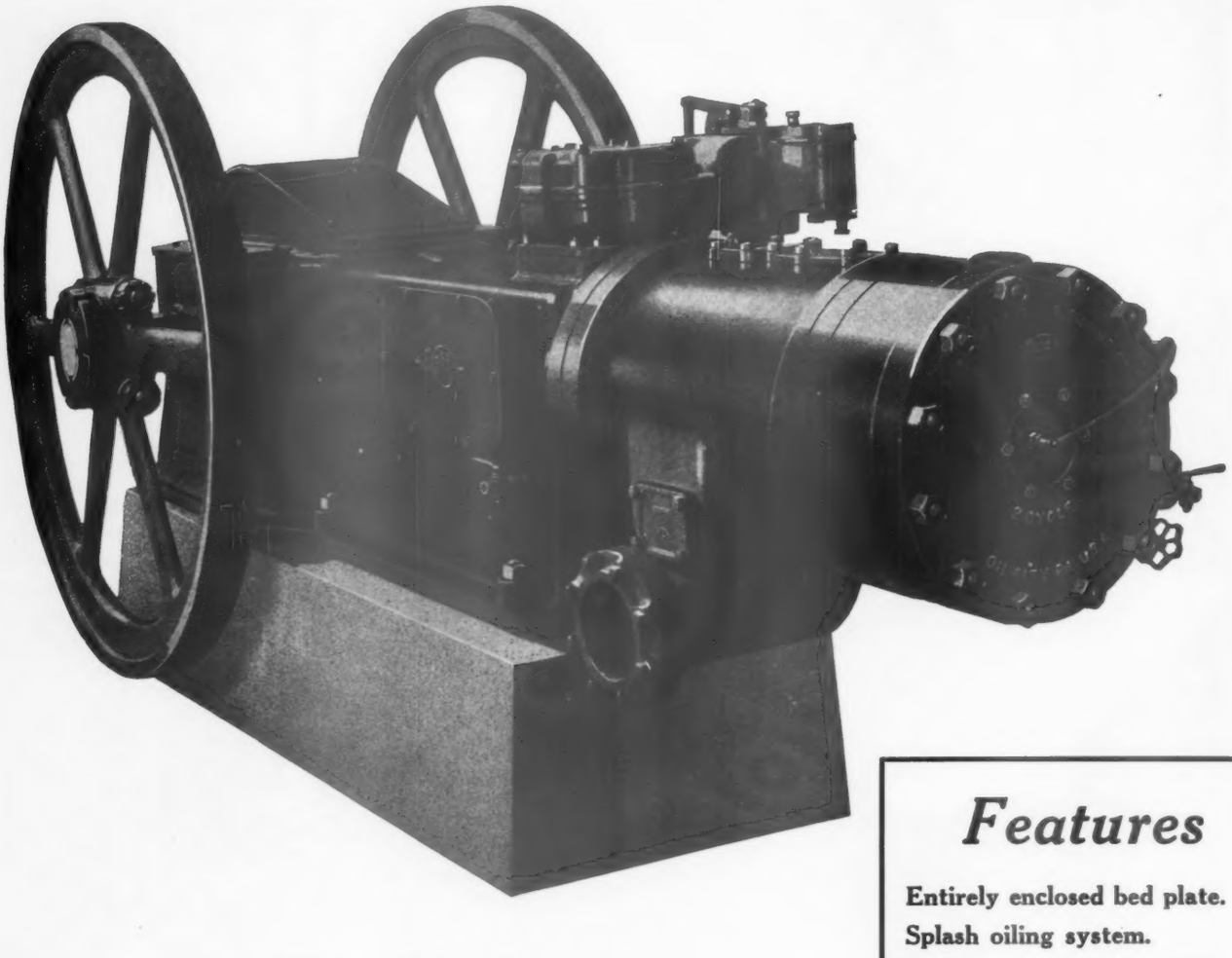

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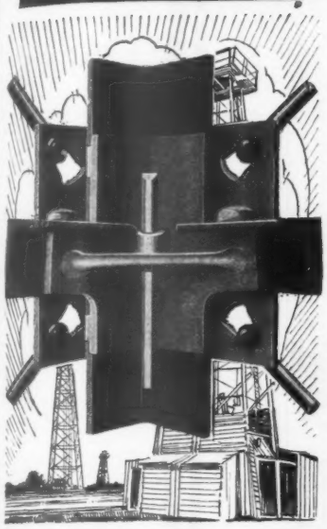

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These features result in superior strength and safety, and assure a tight, springy derrick which is safe for spudding and for high line speeds in drilling.

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north. The Jefferson Oil & Development Co. is drilling a test 4,100 feet south of the dome and if this is not successful in finding oil, a location will be made on the north side for the final test of the dome.

First tests already have been started at Bayou Blue and Bayou Des Glais Domes, Iberville Parish, by the Union Sulphur Co. The Gulf Refining Co. is on its second test at Lutcher Dome, Lafourche Parish. Prospecting has been going on for some time at Avery Island and Weeks Island Domes, Iberville Parish, by the Louisiana Land & Exploration Co., and at Pine Prairie Dome, Evangeline Parish, Evangeline Oil Co. The latter is the most northerly of the known coastal domes.

**Two Famous Fields**

South Louisiana has been the mother of at least two famous pools, namely Jennings (Evangeline), Acadia Parish, and Vinton, Calcasieu Parish. The former, the oldest of the pools in the State, was opened in 1902 and has produced wells with a daily production as high as 50,000 bbls. Vinton also has had a number of notable wells. This field was opened in 1910.

Among other pools in the State are Anse La Bute, opened in 1905; Edgerly, discovered in 1913; Lockport, the initial well of which was brought in during 1924; Sweet Lake and Sulphur, and Feussa Point, 1926; Starks and Hackberry, 1927, and Sorrento, 1928, and Welch. The latter, Anse La Bute and Feussa Point, at present are not on the productive list.

However, since the days of Jennings, Vinton and Edgerly a considerable change has taken place in South Louisiana operations and it is not likely that there will be any rapidly developed flush fields such as have been witnessed in the past. Due to the nature of their location by geophysical methods, all acreage around new prospective fields either is held by one company or several companies jointly, assuring a limited development.

Prospecting in South Louisiana has turned out purely a large company operation. The use of the geophysical methods with their heavy and hazardous costs together with the usual uncertainty and expensive drilling required generally in proving salt dome fields puts the smaller operator with limited means out of the running.

The use of geophysical methods also has produced another situation, limiting the scramble for lease generally concurrent with the finding of oil in other parts of the country. The system of operations in South Louisiana as in South Texas is such that only large companies or a group can start reconnoissance with geophysical machines and when they take options on large tracts for this purpose they are able to keep their findings more or less secret. With this secrecy, companies conducting geophysical work can follow any favorable discoveries with a quiet leasing up of all available acreage around a supposed dome without other companies knowing of the discoveries.

However, other companies can note any change in general reconnoissance to detail work on the part of geophysical crews and quickly move their own instruments into that territory to check the possibility of new salt dome discoveries. In this way they sometimes are able to lease up some valuable acreage before all the land is taken.

But, for the most part, all the newer salt dome discoveries have been leased up in such large blocks that it can be said that the day of real competitive drilling in coastal territory is past and that all new fields will be developed in such a way as not to endanger market conditions, yet providing extensive potential oil reserve.


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## HANDLING CORROSIVE CRUDES BIG PROBLEM

(Continued from Page 102)

either offset by other chemicals or different metals have to be used in the equipment. The same applies, even in a more intense degree, to cracking of gas oils or fuel oils from such crudes.

Scientists and research chemists are straining their talent to overcome all these difficulties, so the refinery may be prepared for the coming onrush of the corrosion menace. Refineries with large capacities especially must face this problem more than the smaller concern, which may be more favorably located close to "sweet" crude production, which it might obtain easier in sufficient quantity due to smaller crude requirements. There is no doubt that these difficulties will be overcome by research; however, it will convert the refining industry more and more into a chemical industry and the chemical engineer will equal, if not overshadow, in importance, in the future, the mechanical engineer in refinery design and operation. It is obvious that operating and maintenance cost will be higher in view of the foregoing, large investments will have to be made for suitable new equipment and the expense of research and chemical control will have to be added to the final cost of finished products. In any other industry, such conditions would increase automatically the sales value of their products. I am afraid the refiner will have to figure with low gasoline prices for some time to come and will have to reduce his production costs in order to bring them below sales price and allow a profit. This can only be accomplished by large and highly efficient equipment, often especially designed for one grade of crude and inefficient for some other crude. We see today the big concerns replacing distillation and cracking equipment—considered inefficient after only a few years operation—in order to reduce production cost of refined oils by cents and fractions thereof. Only very rich companies can afford to write off such large investments long before actual depreciation and amortization takes place.

Keen competition and changes in motor construction force a gradual change in specification. The time is not far off, when the present U. S. Motor specifications will exist only in print and each refiner will try to surpass the other in quality and have his own specifications. Such tactics might become disastrous to some of them, as the yields from their individual crudes could be reduced to a point where it might be impossible to continue operation.

The lubricating branch of the industry looks much brighter to me. Manufacturers of automobiles, engines and machinery as well as the general public seem to appreciate more the value of a good lubricating oil and are more willing to pay a fair price for it. The advent of the high-speed, high-compression motor and the rapid growth of the aeroplane industry have created a demand for high-grade lubricating oils.

Existing specifications are no longer the basic criterion for quality; performance in actual operation counts now more than mere laboratory tests. Conscientious and responsible buyers are inclined to look deeper into the quality of lubricating oils as heretofore, they require reports from their engineers and laboratories on actual operating tests. We will see traditional prerogatives and claims overthrown and new specifications set up for lubricating oils to cover actual requirements in operation.

There is a large field open for research and development; the demand is here for real high-grade lubricants for the modern engine, and the refiner who has sufficient supply of suitable crude, the necessary talent for research and development, and the equipment to take full advantage of these assets, can develop a very desirable and profitable business.

Mebby So

But read what an executive of one of the country's largest boiler manufacturers thinks of Shaffer Gauges.

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*Farrar & Trefts Boiler Manufacturers says:*

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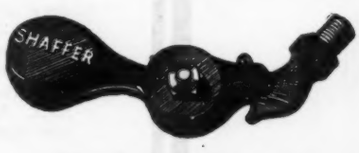


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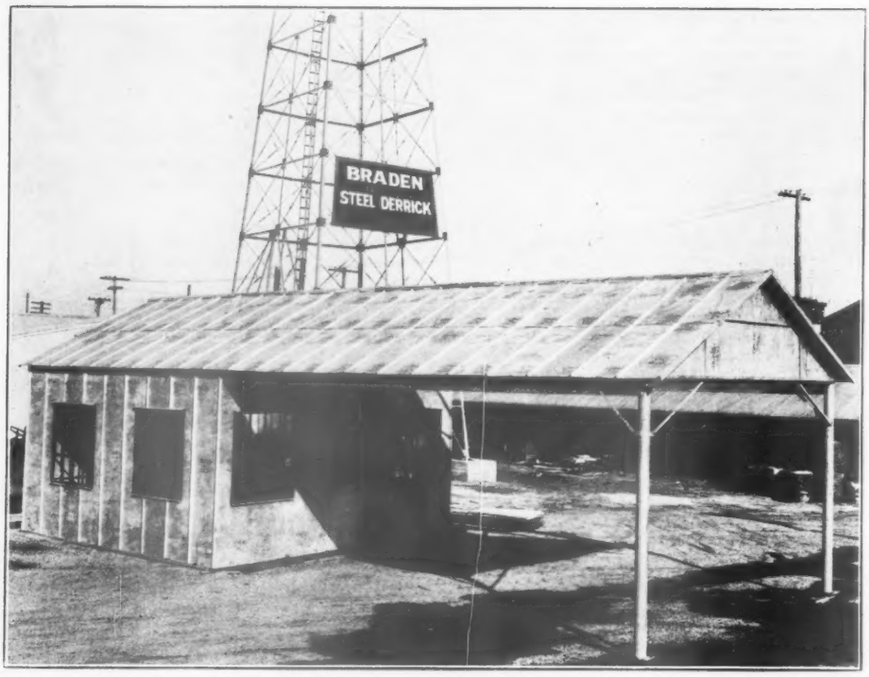


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The remarkable ability of Toncan Iron to defy rust and corrosion is due to the scientific combination of copper and mo-lyb-den-um with pure iron. It was developed by our expert metallurgists in America's finest metallurgical laboratory.

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## EXPLAIN DISTILLATIONS METHODS AND PROCESSES

(Continued from Page 109)

hooking several units as in case four, together.

An acid-treated product such as pressure distillate is generally handled in one or two ways on pipe stills. In case six the operation is satisfactory if superheated steam is used. However, if saturated exhaust steam is used it must take its superheat from the oil vapors which materially increases the steam consumption.

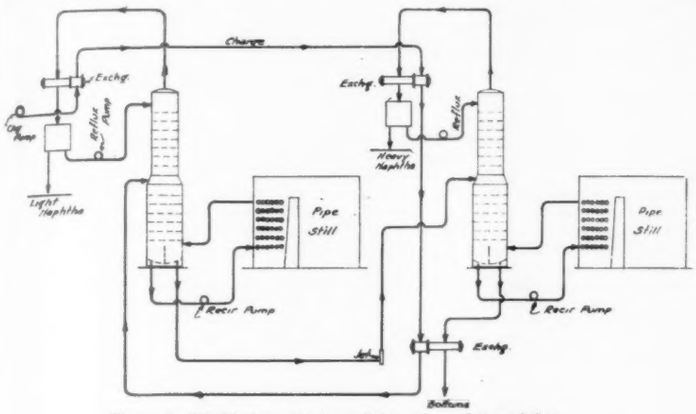


*Figure 5—Distillation unit for refining of special naphthas.*

In running pressure distillate in an installation as in Figure 4, it is easier to obtain better yields than in 6 and saturated exhaust steam can be used since it becomes superheated by direct contact with the hot oil. It is essential, however, that the circulating pump be operated at a very high rate in order to prevent the temperature of the oil exit heater from becoming too high.

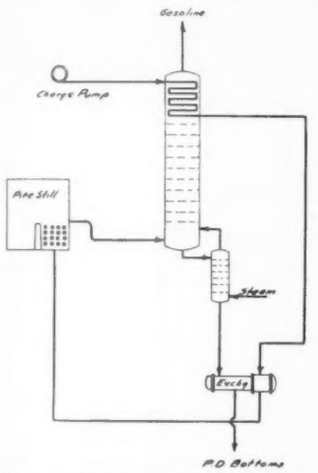


*Figure 6—Distillation unit for acid treated product.*

### Shell Still Towers

The methods of using towers on shell still crude batteries are many in number. However, we will consider only two of them.

Case seven is applicable where it is desired to recover U. S. Motor gasoline, kerosene and gas oil at a low fuel cost and where high throughput through the battery is essential. This operation does not give very sharp separations, but allows very high throughput at low fuel cost. It should be pointed out that the still temperatures are approximately 50 degrees Fahrenheit higher than would be the case if the backtrap were returned to the still.

In case eight sharp, close-cut separations, and a maximum yield of any product can be obtained although the fuel cost per barrel will be somewhat higher than in case seven, and the capacity of the battery will be lower. This layout is perhaps the best for the small refiner whose equipment must be sufficiently flexible that he can make any product the market may demand.

In running pressure distillate on shell stills, two methods are usually employed. In the first place, one still and one tower are run as a unit, the charge being preheated to as great an extent as possible. This method has the advantage that both the lighter and heavier fractions are taken over together resulting in lower evaporation losses.

The use of a shell still in this manner permits the introduction of saturated exhaust steam directly in the body of oil, thereby superheating it which makes the exhaust steam practically as effective as live steam. A shell still does not cause the superheating effect of oil vapors as is frequently seen in pipe stills.

In any case where the charge can be introduced in the still instead of in the tower, larger amounts can be taken overhead in both still and tower since the sensible heat in the oil is picked up directly in the still instead of from circu-

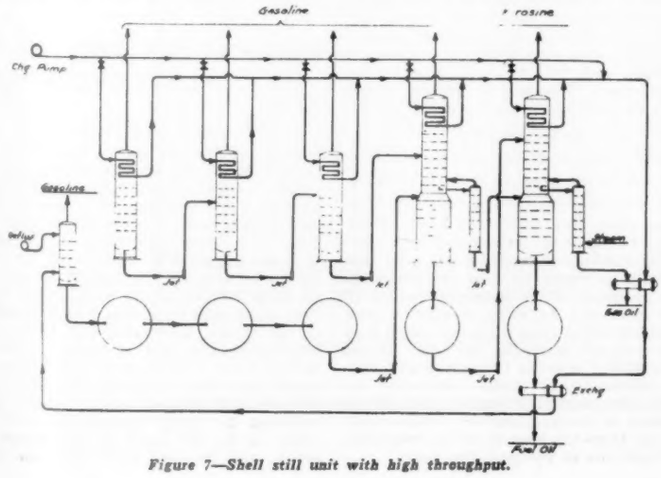


*Figure 7—Shell still unit with high throughput.*

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lating vapor in the tower. In addition the temperature of the oil in the still is lower which increases the capacity of the still for heat absorption. Where cold charge is introduced in the tower the volume of vapor entering the stripping section becomes very large. However, much more reflux must be used where the charge is introduced in the still and it is almost impossible to obtain as good separation which in most cases more than offsets the advantages gained.

### Reflux Condenser

There has been considerable discussion about the use of a reflux condenser versus open reflux on a fractionating column. The open reflux is theoretically the more correct, although in practice it does not seem to give better results. The disadvantages of a reflux condenser are its tendency to leak, its susceptibility to corrosion, and the liability of becoming plugged and inoperative. The disadvantages of the open reflux are the necessity for having additional pumps and lines for each tower, the necessity of providing larger condensers and more condenser water to care for the additional amount overhead, the danger of pumping back water in the top of a tower, and the tendency of rust and other foreign matter to be pumped back into the tower. A larger amount of waste heat can be recovered by means of a reflux condenser, although it does not give the quick and positive control of open reflux.

Another point which sometimes calls forth discussion is the use of reboilers or open steam for stripping the bottoms of a tower. Generally speaking, the writer is of the opinion that a reboiler is more effective, although its upkeep is greater. It is susceptible to becoming plugged, to leakage, and to corrosion. The use of open steam, however, is expensive and uses up considerable tower capacity.

### Lubricating Oils

The question of fractionating lubricating oils is becoming of more importance and considerable work has already been done along this line. The yield of the more viscous and consequently more valuable lubricating fractions has been materially increased by good fractionation, not to speak of the improved quality of the products. In order to make a wax distillate direct from the crude which does not require rerunning in order to be "pressable," it seems to be necessary only to fractionate carefully. Probably the next few years will see as much development on the fractionation of lubricating oils as there has been in the fractionation of light oils in the past five years.

## NEW VAPOR PHASE CRACKING PROCESS

(Continued from Page 226)

charging stock, has approximately the following tests:

| | |
|---|---|
| Gravity | 39.1 |
| Flash | 190 |
| Fire | 340 |
| Viscosity at 100 | 42 |
| Pour | 20 |
| Gasoline in stock | 15 |

The gasoline made has tests approximately as follows:

| | |
|---|---|
| Color | 16/21 |
| Initial | 90°F |
| 10 per cent | 154 |
| 20 per cent | 170 |
| 30 per cent | 204 |
| 40 per cent | 230 |
| 50 per cent | 248 |
| 60 per cent | 280 |
| 70 per cent | 320 |
| 80 per cent | 340 |
| 90 per cent | 382 |
| 95 per cent | 408 |
| Iodine number | 105.1 |
| Naphthenes | 15.1 |
| Olefines | 60.0 |
| Paraffins | 9.8 |
| Aromatics | 24.1 |

The foregoing tests on the gasoline made, in a measure reveal the remarkable properties of the product. It has been found that when this material is mixed with 50 per cent of a straightrun gasoline, it has approximately the same anti-knock properties as a blend of 50 per cent benzol and straightrun gasoline. Another interesting product made from the Gyro process is the fixed gas. This normally has a B.t.u. value of 1,800 per cubic foot, and contains about 55 per cent of unsaturates, making it an ideal raw material for many kinds of chemical syntheses.

Still another interesting product made is the fuel oil. The fuel oil produced is low gravity, low in viscosity, zero pour test, and contains no solid material that might settle out in storage.

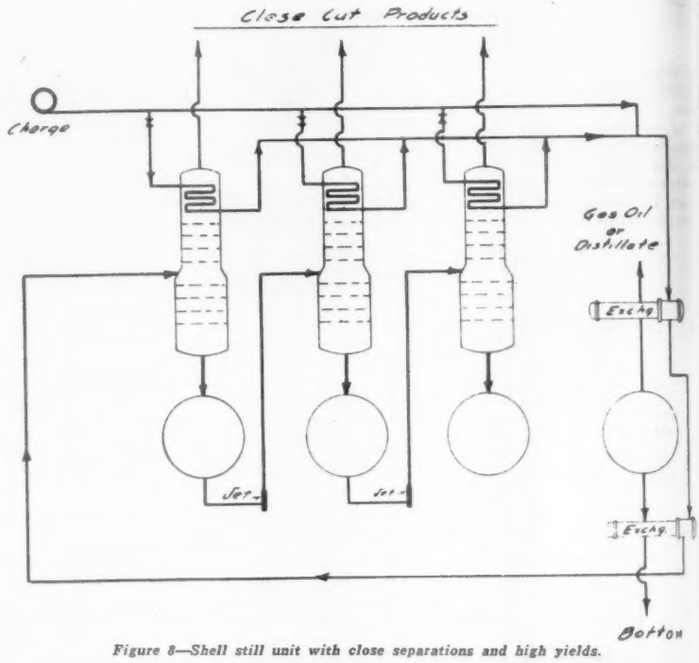


*Figure 8—Shell still unit with close separations and high yields.*

## PHYSICAL CONTROL PLANT OPERATION

(Continued from Page 106)

relation of the reading be constant, an equally useful and true indication is assured. Likewise, handling of individual burners may be eliminated, assuming, of course, that provision is made to proportion the air for combustion, by the use of a master valve to control the fuel to all burners, using the individual valves on these burners simply to distribute the heat in the fire box; thus a modification of the control fuel valve will affect all burners equally, and maintain approximately even conditions in the fire box under all rates of firing. The flow to the coil may be maintained constant by metering the charge through the control house or by the speed of the charging pump, and the fuel main may also be

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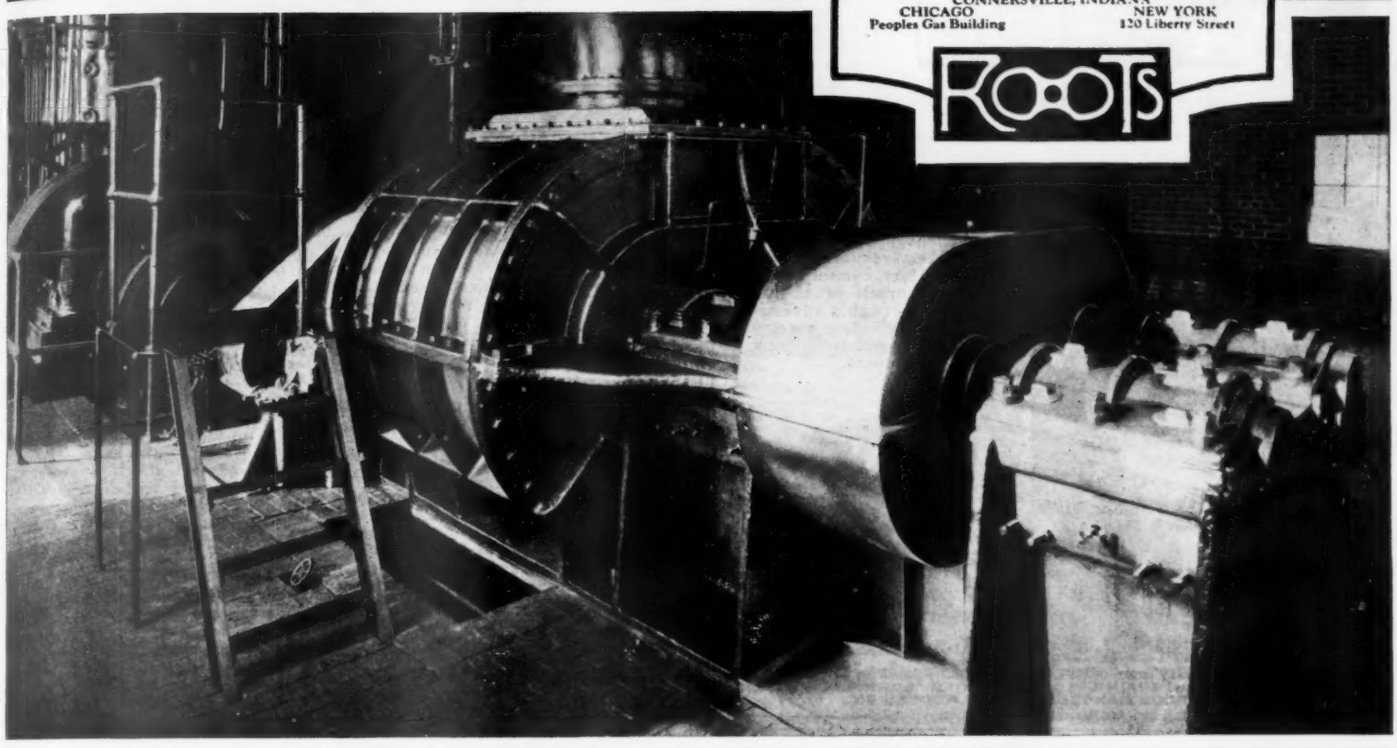
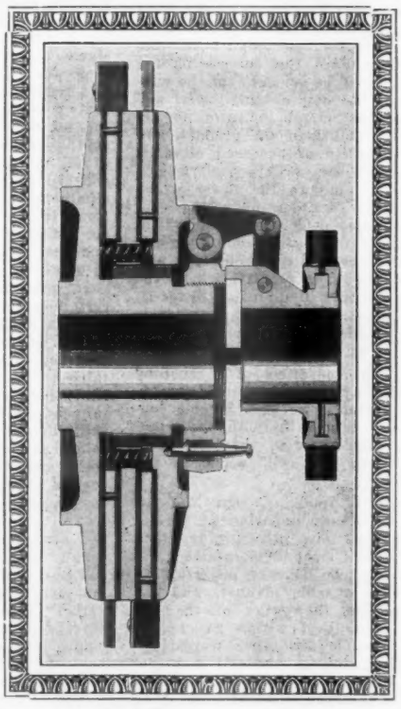


## ALMOST IDEAL



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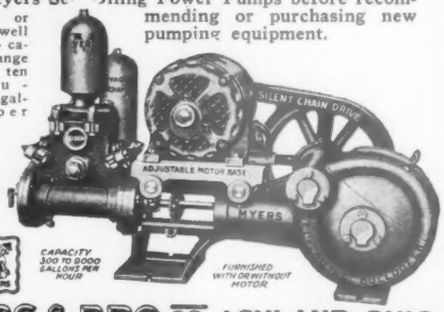


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*Industrial Cleaning Materials and Methods*


maintained at constant pressure by the use of a reducing valve on the line. As a matter of fact, in many instances, it is desirable to substitute a reducing valve for the master valve serving all the burners and provide a gauge on the burner header. The fireman may then definitely effect increments of pressure, and reduce the inaccuracies which may be due to even slight fluctuations in the main, or those due to handling a valve by adjusting the position of the steam to make corrections. His regulating control of the temperature of the furnace is essentially the pressure on the burner header, which bears a more direct relation to the temperature at the outlet than the position of the stem on the master valve. The control of the furnace is thus effected by observing the reading of a pyrometer, which bears a definite and constant relation to the outlet temperature, and making changes on the reducing valve which will be reflected by increments in the pressure gauges on the burner header.

In a more complete apparatus the matter of reducing the number of variables is obviously more difficult, and it becomes necessary to subordinate secondary regulatory controls, in order to effect regulation with the one which has the greatest influence on the operation.

### Simple Topping Unit

In this connection, let us consider the operation of a simple topping unit where the crude oil is pumped to and heated in a coil, separation of the various fractions made in a separating chamber and a fractionating tower, and the products from the tower condensed in the usual manner. We are primarily interested in extracting the maximum amount of gasoline from the crude, producing a tower bottom of proper flash, let us say "gas oil," and a residual bottom of reasonably uniform quality. These separations depend primarily on the amount of heat imparted to the oil and the cooling effect in the separating chamber and the tower. The cooling effect on the chamber depends largely on radiation and evaporation, while the cooling effect in the tower, although dependent on radiation and evaporation, is more affected by the reflux pumped back to control the quality of the overhead product. The main disturbing elements are, obviously, the variable radiation and the inaccuracies due to handling the equipment.

If we consider that the overhead from the tower is the primary product and that the quantity and quality of this product determines the success of the operation, it will be evident that the temperature at the top of the tower will constitute the control indicator to determine the quality of the product, and that the quantity of overhead obtained from the apparatus will depend largely on the heat input to the tower which will constitute another indicating control. It is also evident that the variation of these factors, to obtain proper control, must be limited to obtain a useful result and their regulation must be related. The heat input to the tower is, obviously, the most important variable and will dominate the control of the temperature at the head of the tower.

Leaving out the effect of a reboiling coil, which may be used in the tower to strip the bottoms, we then become concerned more essentially with the quantity and temperature of the liquid and vapors leaving the coil, which is the source of heat.

The uniform input of heat into the tower is of utmost importance. To insure this, the flow of charging stock through the coil must be maintained constant and may be done by metering the charge in a suitable manner, and the temperature at the outlet of the coil must be maintained within as close a limit as possible; in other words, the rate of flow through the coil and rate of firing must be maintained in relation to each other and, theoretically, they should both remain constant. This, of course, is not possible, since variations must take place and one or the other factor must be made a variable to effect regulation in order to approximate the ideal conditions, and compensate for changes beyond control.

### Method of Regulation

It has generally been found more desirable to alter the rate of firing and maintain the flow constant, as this method of operation gives regulation with the least general disturbance. The regulation of temperature, maintaining the flow constant, can then be effected by the fireman in a similar manner to that previously described, and the means of regulation can be made responsible for the over all result after other secondary controls have been adjusted to the rate of firing. The constant changes in atmospheric conditions and other factors necessitate a secondary regulation on the tower, which will vary the amount of reflux within a limited range, to control its outlet temperature. This variable, however, should be utilized as little as possible and if stress is laid on the uniformity of input of heat to the tower, better fractionation will be accomplished and a greater capacity will be obtained. It is unreasonable to expect that tower regulation can compensate for major variations in heat input and, in many cases, failure to hold the temperature of the top of the tower may be traced to this fact.

If the temperature at the top of the tower be maintained accurately in spite of fluctuations of heat input, a considerable disturbance will ensue in the tower, caused by the large variation in reflux, and will affect the accuracy of fractionation and tend to reduce the capacity.

The foregoing examples are, to say the least, elementary but they are cited in an attempt to illustrate the type of things which must be considered in connection with control work and to suggest a method of approaching the problems involved.

In refinery practice it is not always a simple matter to make a choice of variables, either for indication or control, since their effectiveness may be reduced by design, operating methods, or the combination of parasitic variations of auxiliary equipment.

### Factors in Control

Surveying the chief requirements which permit control, we might say that the successful control of equipment in general depends, primarily, on correct design, because it is in design that the greatest result can be achieved in eliminating disturbing variables and in turning a difficult control problem into a single one; it depends on the proper choice of variables, both for indication and regulation, and on the choice of the best possible balance between the factors of time and simplicity; it depends on the careful and systematic regulation of all variables affecting indirectly the finished product, and which cannot be eliminated by design; and last, but not least, it depends on the realization that accurate control means greater returns and that some sacrifices are warranted to obtain it.

In general, apparatus to carry out a certain process must be so designed as to make control possible, and further, the method of operation chosen must be such that the control features are fully capitalized. It is, too, often possible, by skill of operation, to make up for certain defects in design, but this operating skill obviously should be employed to obtain maximum results and not to overcome avoidable faults. The matter of control is usually given a good deal of consideration with regard to the disposition of equipment, valves, etc., although not always in the right direction, and such consideration is often encumbered by customs initiated in obsolete apparatus. Improvements in control are almost invariably possible, in practically all types of refining equipment, if this feature is emphasized and the limitation of instruments is taken into consideration as well as that of the apparatus.

The largest part of refining practice deals with heat treatments and almost all the other factors encountered, such as pressure, etc., result from heating the stock to be refined. It is not surprising, therefore, that in almost every case, reg-

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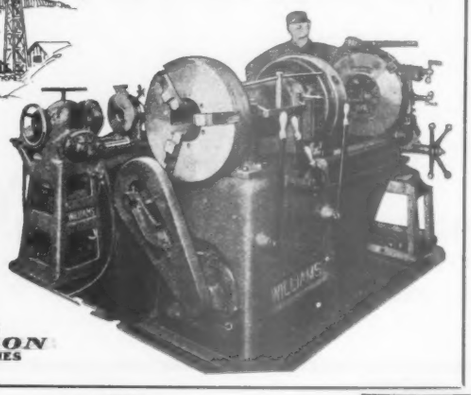

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ulation of the application of heat is the most important factor in operating control to which all others may be subordinated. In any distillation or heat treatment, every effort should be made to facilitate the control of the rate of firing, and other variables, encountered in the carrying out of the operation, may be generally considered secondary and adjusted to it.

The regulation of flow of fluid through a system is of prime importance in continuous processing, but it differs in its application from that of control of heat input, in that it is not necessary to utilize its variation to the same extent to compensate for the changes.

Equipment required for constant flow, such as constant volume pumps or meters has not proved entirely satisfactory and there is much room for improvement in this field. For lack of a better means, the use of pumps in tandem is often useful, since the high pressure pump can be made to operate on a comparatively small pressure differential, reducing the slip and permitting more accurate stroking. This is, obviously, a crude approximation of the desired result and in the future, doubtless, pumps will be supplied with governors on the output in much the same manner that a steam engine is supplied with a governor for speed.

### Variable Steam Pressure

Of the many variables which have to be contended with in the operation of a process, the effect of many are unavoidable. There are some however, which complicate the problems of control and which could be eliminated if sufficient importance were attached to its accomplishment. Probably the worst offender in this is variable steam pressure, which is encountered in almost every refinery.

In most cases, the charging pumps in refinery equipment are operated by steam and, needless to say, variations in steam pressure cause fluctuations which have to be corrected either by hand or by such devices as may be used for this purpose. It is evident that fluctuations in steam mains are undesirable and it can hardly be said that they are caused voluntarily. It is almost universally true, however, that pressure variations occur at various periods during the day in a refinery, and that they are particularly severe in winter time. They can be eliminated by the proper use of reducing valves but, in many instances, insufficient drop in pressure between the main line and the charging pumps defeats the corrective action. In this connection, it is sometimes useful to substitute a reducing valve for the throttle valve on the pump, which permits the valve to operate under greater pressure differential, since the low pressure side is on the steam chest proper and its use permits setting up a definite and constant pressure on the pistons.

There is probably no portion of a refinery which is more overloaded than the steam plant, since equipment is increased from time to time, building up load on the boiler plant little by little, until it finally results in sufficient shortage of steam to cause fluctuations in the mains. These fluctuations are multiplied by the ratio of the steam to the oil cylinders, and operations, which would normally be stable and uniform, are rendered troublesome.

It should be clearly borne in mind that when putting in expensive additions to equipment, adequate steam supply will permit the new equipment to produce better returns by the avoidance of fluctuations. An overloaded boiler plant invariably means poor control.

### Fuel Problem

Another source of trouble, which appears to be common, lies in the fact that a refinery is usually required to burn whatever fuel oil happens to be available and, in some plants, even sludge fuel is mixed with the fuel oil and burned under the stills. Variations in fire will often result in appreciable decrease in capacity and quality of products, and it should be a question of serious consideration whether a better grade of fuel would not pay, at least in some of the more delicate operations, in view of the improvement in control. Probably the least trouble from poor fuel oil would come by burning it under the boilers if a little excess capacity were available to absorb fluctuations.

### Automatic Devices

The use of automatic devices to effect control will, undoubtedly, take the place of hand operation more and more in the future. The use of these devices will require the same consideration as that which should be given in facilitating hand control. They should be, of course, capable of a wide range of control but we should endeavor to limit their action to the smallest possible variations. It should be borne in mind that any regulating control that is working, disturbs the operation of the whole, and that best results are invariably obtained from apparatus when it is in balance and requires no adjustment. Perhaps their most important function should be to find this balance quickly and maintain it with the least effort.

The function of an automatic device is, essentially, to reproduce, if not to improve, human action and, in any case, the detail of its action is closely parallel. It has, of course, the advantage that its operation is continuous and that nothing save failure can disturb its appointed method of doing its work. It has no other interest, beyond that for which it is intended, and may combine, in its effect, recognition of several changes in the apparatus, always interpreting and counteracting them in the same way.

A great deal of knowledge exists in the physical principles which underlie instruments and their action, and the suspicion with which instruments of automatic devices have been looked upon is warranted only by the fact that many times instruments are improperly used or not developed to operate under conditions imposed. A clearer realization of the purpose for which they are intended will bring about the development of far more suitable instrument equipment. A large part of the problem of fostering this devolpment is encumbent on the refiner.

### Four Types

Most refinery operations can be carried out with four general types of automatic devices; temperature control, flow control, level control and pressure control. A great deal of work has already been done on temperature control and this problem appears to have been solved for the present. Some satisfactory flow control and level control devices have been developed but their use is not yet as extensive, and, although these are, comparatively speaking, of less importance, they will be required more and more in the future. Many existing pressure devices are very satisfactory for certain classes of work, but some new types are required to perform the duties of expansion valves with more accuracy and reliability and be capable of operating under high temperatures. It is expected that apparatus of this character will be available shortly for commercial installation.

The control of equipment is largely based on the transfer of motion at a distance and many of the devices at present in use have employed air, steam, liquid and electricity as motive power to transfer these motions. Those who have operated refineries in cold climates would, doubtless, be able to give a vivid description of the troubles attending the use of air and steam; and those who have used hydraulic systems for transmission of power could also recite tales of woe.

The solution of most remote control lies in the use of electricity, since cables can be properly safeguarded, and if an installation be properly made, it is capable of more reliability than other systems. The difficulty in connection with electric transmission of motion has been due chiefly to failure of motive power and contacts, and complicated mechanism to carry out the required motions. Power failures, however, may be eliminated by making provision for auxiliary generators, underground conduits and armored cables. Contact difficulties can be practically eliminated by the use of alternating current and better relays.

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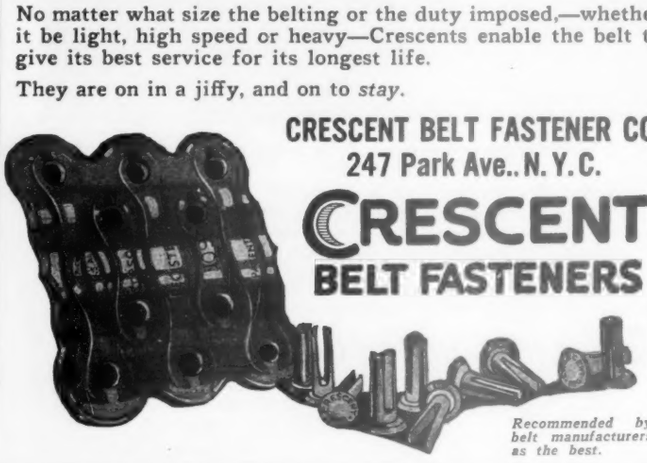

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transmission of motion, it is interesting to note that an electrical system of transmission of motion, which has been in existence for about 14 years, has been adapted to some of the uses suggested above and is available and can be developed to adapt itself to almost innumerable applications. The particular system comprises a pair of motors connected with four wires and energized with single phase, alternating current. The armatures of both motors are always in phase and the motion of one will affect the motion of the other within remarkable accuracy. These motors, developed by the General Electric Co., were first used on the Panama Canal to reproduce the position of the locks. They have since been used in connection with the fire control equipment on battleships and engine-room telegraphs and various types of indicators.

When it is realized that a slight motion of the armature of one of these motors can be transmitted to any number of points, at practically any distance simultaneously and accurately, we can well imagine the possibilities that such transmission will have in refinery equipment. They can be used to operate valves in remote places and record their position, transmit level indications and pressure readings at a distance without danger of failure in lines, and doubtless the adoption of this principle, in time will effect material changes in design by giving more freedom in position of control valves and equipment, which must now be placed in such manner that they have to be handled manually.

In the foregoing, an attempt has been made to generalize on physical control of equipment, but obviously, the subject is so broad that only the salient features can be touched. It really represents a new phase in refinery engineering, and the new study and application of the principles of control will go a long way toward making available the economies which have been sought in the design of modern equipment. This phase of refinery engineering must be taken seriously, it must be realized that it is distinctly a specialty, that reasonable concession should be given to improvement of control when undertaking new designs, and efforts should be made to modify existing operations and equipment to make adequate control possible. There is no field of refinery technology which offers more interest, and none which offers so much return to the refinery for moderate expenditures.

# PRODUCTION ENGINEERING IN 1927; REMARKABLE RECORD OF PROGRESS

By J. B. Umpleby*
*Chairman Production Engineering, Petroleum Division, A.I.M.E.*

Economic waste in the oil industry is tremendous although resource waste is negligible. Waste, lies chiefly in the fields of competitive finding and acquisition, competitive development and competitive marketing. Most costly of these is probably competitive development and as this is primarily the field of the production engineer he cannot refrain from taking interest in it. He cannot give too careful study to problems of well spacing, defensive drilling, gas energy utilization and the physical problems of unit operation.

### Unit Operation

Unit operation has so many advantages in so many fields, both to the consumer and to the industry, that it or some equivalent is bound to come on an increasing scale even if revision of law is necessary to make it possible. Working out of details will involve largely information and conclusions to be supplied by the production engineer and he should prepare himself in every way possible for the call. The engineer's part in a unit operation will probably be a continuing one because any contract must, from our present knowledge, leave wide discretion to the operating committee and many of its problems will involve gas energy relationship.

### Gas Energy

During the past year the conception of gas energy has displaced in large part the old conception of gas oil ratio. It is erroneous to measure production efficiency by the volume of gas that accompanies a barrel of oil because volume increases in effectiveness as an expellent of oil as pressure increases. The true measure of efficiency is the degree of effective utilization of energy stored in the reservoir, hence, the new term, gas energy. If the relationship of gas energy consumed to oil produced is to be taken as the measure of operating efficiency a vast field of research is opened. Clearly the amount of energy necessary to move a barrel of oil a given distance will vary with the character of the oil and reservoir rock. To get a measure of these several variables will require much fundamental research in the field of viscosity, oil composition, character, composition and size of sand grains and composition of gas in addition to pressure, volume and temperature determinations. I conceive, however, that the time will come when we can analyze bottom-hole data and compute for a particular situation the optimum of operating efficiency. Certainly the field is alluring and worthy of investigation. It seems to me that such work should properly be classed as fundamental research in physics.

The idea of conserving gas energy has lead to notable achievements during the year. In the Ventura Avenue Field in California, careful study of production and elimination of certain wells has effected a reduction said to be around 25 per cent in gas blown into the air without seriously affecting production. This is a remarkable example of what can be done by co-operation in a closely drilled field of diversified ownership.

### Well Spacing

Well spacing has received much attention during the year largely because many believe that wider spacing at Seminole would have yielded more profit without breaking the oil market. Well spacing is largely a matter of the balance sheet and it has been generally held that the closer wells are spaced the greater the recovery per acre. At our Fort Worth meeting, however, Prof. L. C. Uren advanced a contrary view. If his contention is correct it will have a revolutionizing effect on the industry. Uren contends that most of the gas energy is consumed in moving oil the last 10 feet toward a hole because of the converging lines, hence faster rate of flow. He concludes—"Providing the wells are not spaced beyond the oil-drainage radius of each other, the fewer the number of wells used, the less rapidly will the oil be drained, and because of the lower average rate of flow of fluids through the sands, the energy consumption per barrel of oil produced will be lower. Hence, the ultimate recovery of oil will be greater for widely spaced wells than for closely spaced wells." His contention is supported by laboratory experiments which, although not fully convincing because of the limitations of the equipment, are highly suggestive and warrant much careful field observation, particularly where town lot areas comprise parts of pools.

J. H. Gardner has pointed out the adverse relation between close spacing of wells and the balance sheet at Seminole and T. B. Slick recommends developing one Wilcox pool on the basis of one well to 40 acres as an experiment.

### Forty Acre Locations

To this may be added another thought. If the first generation of wells throughout any pool are drilled on 40-acre locations production peaks will be lowered, storage building programs reduced and excessive costs due to rapid development

*Before A.I.M.E., New York Meeting. Copyright, 1927, by the American Institute of Mining and Metallurgical Engineers, Inc.

averted. The greatest advantage, however, will result from a determination of the limits of the pool and the merits of its different parts. In places, such as parts of Hutchinson County, Texas, further wells would not be drilled and in others such as Burbank, there would probably be a second generation of wells on 10-acre locations. In the former case the saving is obvious and in the latter case the fifth or central well would pay a profit as an intake for gas in the maintenance of pressure. This fifth well could be produced until the 10-acre locations were drilled. Time will not permit further development of this plan but I believe it can be worked out by agreement between lessees without doing injustice to the royalty owner, the small or large operator, and without justifying opposition by the Department of Justice or the State Conservation Commissions. It seems to have many of the advantages of unit operation and to avoid many of the difficulties.

**Repressuring**

Repressuring, by the injection of air or gas into partly depleted sands, has not expanded in 1927 as it did during the two previous years. Periods of overproduction do not encourage this sort of activity but the idea of pressure maintenance, which might better be called energy maintenance, has received much attention. This has gone hand in hand with a clearer recognition of energy relationships in the sand. Energy may be maintained by maximum utilization in production and by injecting compressed gas or air through central wells; by not allowing gas to escape unduly at the front of the column and by adding it at the rear of the column. The injection of gas or air through central wells early in the development of a pool seems to be sound in theory and practice and will undoubtedly come into much more general use. It is now being done using pressure up to 1,200 pounds. Closely related to it is the use of old fields and parts of fields as storage reservoirs for gas in order to avoid the construction of steel containers by gas distributing companies. This is receiving serious attention in California.

**Air-Gas Lift**

Turning from general problems to concrete accomplishments, the development and utilization of the air-gas lift in 1927 is outstanding. This method, known and used for more than a generation, came into prominence in handling deep production from crooked rotary holes in California in 1926. Its greatest development, however, resulted from application in Seminole during 1927. At the beginning of the year it was a try and fit method with few of its principles understood. At the close of the year many of the principles were known and the data necessary for the determination of others were clearly recognized. More important than this advance, however, is the fact that a large group of engineers nad operators have become acquainted with the method thus insuring its further use and development. Application is at present limited to larger wells because of the cost of installation but it is surprising what small wells can be handled profitably once the plant is in. In fact, some of our leading engineers believe there is no point at which it pays to take a deep well off the air and put it on the pump. Because of the excellent control of back pressures afforded by the air-gas lift, reduction of the problems of well maintenance and its advantages over pumping in crooked holes, it seems that a wide expansion in its application is imminent. Outstanding problems are corrosion incident to its use, simplification in design to afford lower cost, and a further knowledge of fundamentals to the end that specifications for any particular situation may be predetermined with greater assurance.

Closely parallel to the development of the air-gas lift has been an increased understanding of the significance of gas oil ratios. The amount of gas accompanying a barrel of oil from any well gives an excellent measure of the comparative efficiency of operation from day to day of that particular well. In the light of our increased understanding of the relation of gas volume to gas energy and of gas energy to oil production care should be exercised, however, in measuring on this basis the relative efficiency of operation of different wells and more especially of different fields. In different pools and in different parts of the same pool maximum efficiency may be represented by widely different gas-oil ratios.

## ECONOMIC OUTLOOK FOR OIL EXPORTS

(Continued from Page 111)

and sale of all oil products in Spain was granted to a bank consortium made up of some 37 of the most important banks in Spain. The oil properties in Spain of British, American and other nationals are to be expropriated and the owners reimbursed according to an established plan. A Spanish royal decree published on October 20 gives the director general of the stamp tax full powers to take any action necessary to assure an adequate supply of oil until the company which has been awarded the monopoly is in normal operation. The Minister of Finance is authorized to seize immediately any or all petroleum producing or distributing organizations if he judges this to be in the public interest. When the Minister of Finance judges it necessary, he is to place before the Council of Ministers proposals for all or any seizures of property, indemnification for which is to be made later in accordance with Article 10 of the original monopoly of June 28. The stamp tax director can impose fines up to 25,000 pesetas on any interest obstructing the execution of the above provisions. Criminal proceedings and higher fines may be inflicted upon a majority vote of the cabinet.

The original decree of June 28 automatically prevents legal recourse to the courts for the determination of property values and provides a special commission for this purpose.

**Situation in France**

Reports from France advise that an alternative to a state petroleum monopoly has been proposed in the form of government regulation of imports by a system of licensing. A tariff differential is to be established in favor of crude oil imports to rehabilitate and re-establish a refining industry in France. This latter legislative proposal seems to have a reasonable expectation of becoming law within the near future, and April 1, 1928, has been determined upon as the date upon which possible new petroleum legislation shall become effective.

It will be recalled that April 1, 1927, was the original date set for the establishment of a French state monopoly for the importation of all oil products into France, but that through a compromise agreement between the government and the promoters of this legislation a delay until January 1, 1928, was accepted for the actual establishment of such a monopoly. Further legislation was, and is still, needed covering the general regulations for the organization of the import monopoly, either by the state or through its concessions to a company under state control. This date of January 1, is not imperative but depends upon the results of investigations made by a committee of 44 members designated equally by the Chamber of Finance and Mines Committee. It is understood that a majority of this committee favors early enactment of monopoly legislation.

Several bills have been introduced into the French Chamber of Deputies during the past two years for the operation of a petroleum monopoly. Prominent among these was the Margaine Bill, which called for the formation of a company with a capital of 400,000,000 francs, with half of the shares plus one to be subscribed by the state. Private refineries under this bill would operate only on concessions from the government and all installations, warehouse, tanks, tank cars and barges would be subject to requisitions for which an indemnity would be paid. In France the chief obstacle to a petroleum monopoly has been based on the difficulties encountered in securing the necessary operating capital and credits.

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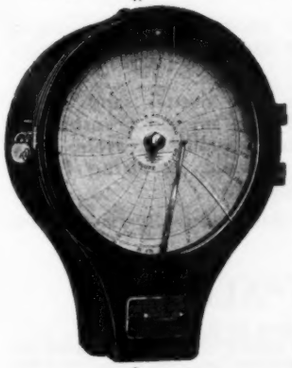

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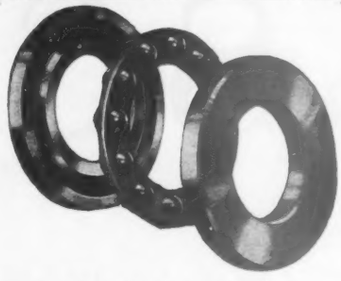

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pany known as the Azienda Generale Italiana Petroli. The official statements made on the formation of this company deny all intention of monopolistic control. According to Italian sources it is supposed to "assist" private enterprise and exercise disciplinary control on the operations of foreign oil companies in Italy by selling oil at reduced prices. Its original capital of 200,000,000 lire has been spent twice since its formation in 1926, and operations continue largely by reason of grants from the national public treasury.

Russia, of course, represents a complete nationalization of petroleum production and monopolistic control of both domestic and national income is from the oil industry. The demands of other branches of the Russian government on this revenue have been such that funds for exploration work, maintenance and replacement of equipment in the oil industry itself have suffered. More detailed discussions of Russia will be offered later.

Rumania, by its mining law of 1921, nationalized its petroleum industry for the purpose of protecting itself from foreign exploitation of so vital a national resource. None but Rumanian citizens may hold title to oil properties and no thought of control of actual production or sales was expressed or implied. The elementary fact that the petroleum industry required tremendous amounts of capital for its continuous operation and that Rumania lacks such capital was ignored. From the standpoint of continuous production the Rumanian fields are among the oldest in the world. In 1926, production reached a new high figure for all time.

**Cartel in Poland**

Poland prefers the Cartel system and on December 10, 1927, established a new Petroleum Cartel to control oil production and sales. The old Polish Cartel for oil did not function efficiently because, while prices were regulated by the Cartel, the actual sales were transacted by members and an abuse of this privilege destroyed all the benefits under the former organization. The new Cartel proposes to open sales and distribution offices to transact all business in name of the Cartel itself.

The old provinces of Greece have had a kerosene monopoly for years. A number of rumors have recently discussed the early probability of a gasoline monopoly to raise funds for highway development projects.

Turkey has, among other monopolies, one for petroleum which effectively prohibits the functioning of the natural laws of supply and demand. While this monopoly cannot be said to function efficiently, much of its apparent success is due to the fact that the distribution facilities and personnel of one of the large American oil companies occupies an important position in directing the business, utilizing Russian oil almost exclusively.

Quite recently Japan has intimated that a conference may shortly be called to discuss the possibilities of governmental control of production and sales in Japan. Such intimations are periodic in Japan whenever the domestic producers and refiners are embarrassed by low international prices on oil products but may at any time materialize into governmental control and regulation. A law establishing a scale of subsidies for domestic producers has recently been established in the hope of stimulating production.

**Seek Monopoly in China**

The new Nationalist party of China is favorably disposed towards a kerosene monopoly and has made several attempts, largely assisted, it is understood, by Russian influence, unsuccessful to date, to establish such a monopoly. In Canton each 10-gallon case of kerosene is subject to a tax of two Mexican dollars (approximately U. S. $0.94) further subject to special arrangement with the tax collecting officials. Within the past month a tax approximately one-half this amount has been established in central China, subject to the usual arrangements.

The Australian government through the Commonwealth Oil Refiners Co., Ltd., has subsidized the refining and sale of oil products for a number of years at a considerable expense to the public treasury.

Government control of the oil industry in Mexico is apparently in the process of readjustment. Not the least effect of Mexico's difficulties with governmental control of the oil industry as regards the United States, has been the spread of the Mexican policy to such South American countries as Argentina, Chile, Colombia and Peru. These countries seem to be on the threshold of untold development of their oil resources, as yet unproved but presumably of great economic importance.

Chile, by an amendment to Article 5 of the National Mining Code, which reserves all guano and nitrate of soda deposits to the state, now includes all petroleum deposits, and all petroleum concessions and claims now in force that are not developed within one year from December 26, 1926, are cancelled and revert to the state.

According to unverified press dispatches of January 27, a new petroleum bill passed by the Chilean Chamber of Deputies suspends indefinitely the granting of petroleum concessions to other than Chilean subjects, while the government has allotted funds for a certain amount of exploration work to determine the actual extent of petroleum resources.

**Legislation in Chile**

A recent bill for the encouragement of the domestic coal industry in Chile has passed both houses of the Chilean congress and is now awaiting the signature of the executive. This bill provides the following rates of duty on petroleum for use in Diesel or semi-Diesel engines. Three pesos (of sixpence each) per gross ton of 100 kilos until December 31, 1928, and of three pesos more for each of the subsequent years, until it reaches 21 pesos per ton, which duty shall continue in force permanently after January 1, 1935.

Proposed new petroleum legislation in the Argentine leans toward a nationalization of production and all sales privileges to be delegated to a monopoly. A sales zoning scheme for the products of the government refinery is now in existence. A considerable legislative battle to decide the question of national versus provincial rights must be settled before any such national legislation may be enacted.

Brazil has a bill now pending in congress to clarify the amendment to the constitution adopted in 1926, which declared all mineral rights to be the property of the nation. Included in this bill are a number of regulations governing petroleum exploration and development which show a tendency to federal control.

In the brief outline as given above, slight mention has been made of the innumerable restrictions placed on the oil trade abroad by means of special tariff discriminations and the multitudinous variety of taxes on production, storage, sales and consumption.

**Refineries Abroad**

B. 2. Tendency to Develop Petroleum Refineries Outside of the United States.—In recent years there has been a very decided tendency to develop a petroleum refining industry in many foreign countries. While few countries have developed actual refining capacity which is immediately affecting our petroleum export trade, the indications for the future are not so promising.

Two interesting outstanding examples of this development are England and the Argentine. Preliminary figures for England for 1927 indicate that British consumption of liquid petroleum products excluding bunker fuel oil is approximately 2,000,000,000 American gallons which represents an increase of 12 per cent above the consumption for 1926. The increase is accounted for chiefly by larger imports of crude oil for domestic refining. The imports of refined products are about 2 per cent larger with American participation, some 60 per cent of the total against 57 per cent during the year 1926. The proportion of the total British petroleum consumption furnished by the United States declined from 53 to about 50 per cent, due to larger crude oil receipts from sources other than the United States and despite larger actual imports of American refined oils. American par-

ticipation in British petroleum trade during 1928 may expect certain limited increases in refined oils, but a progressively increasing total of British requirements probably will be supplied from other sources with higher crude oil imports for domestic refining an increasingly important factor.

### Refining Growth in England

The British Board of Trade Journal, a government publication, gives some figures which illustrate the rapid growth of the petroleum refining industry even in countries which produce no petroleum. As recently as 1913 Great Britain imported only 1,000,000 gallons of crude petroleum, getting practically all her petroleum products abroad. Then importations of crude oil, to be refined in Great Britain began. They have since risen steadily until the 1,000,000 of 1913 has grown to 539,000,000 gallons in 1926. Of this the greater part came from Persia, Venezuela, Mexico, Colombia and the United States together furnishing about one-fourth of the petroleum.

Imports of gasoline into Argentine for the first nine months of 1927 show a decrease of 244,000 bbls., or 12.7 per cent, over the same period of the preceding year. This decrease is undoubtedly accounted for by the increased supply available within the country as a result of the government operation of the 12,000-bbl. refinery at La Plata, near Buenos Aires.

Spain has included as a part of the royal decree establishing the petroleum monopoly, referred to previously in this article, a provision that within a period of five years from January 1, 1928, the Monopoly Concessionaire must develop sufficient refining capacity in Spain to supply 80 per cent of the domestic requirements of refined petroleum products.

France by the same proposed legislation to regulate oil imports also includes a provision to stimulate the importation of crude oil for the rehabilitation of the French refined industry.

### South America

Some time ago a large American oil company, active in Colombia, announced its intention of establishing a sizable refinery at tidewater in Colombia, probably near Cartagena. By the recent Emergency Petroleum Bill of Colombia, the Colombian government indicates an intention to build and operate a governmental petroleum refinery. Whatever the outcome in regard to petroleum legislation at the next Colombian congress, no additional refining capacity there will disturb American export trade during 1928, although it must be expected in the near future.

The Mexican Eagle Oil Co. (Royal Dutch-Shell) is building a sizable refinery at Aruba, Dutch West Indies, to process Venezuelan crude oil. Indications are that American interests will shortly establish a large refining capacity either in the same place or in Venezuela, the refining industry to secure larger benefits to the national economy from the remarkable development of Venezuelan petroleum resources.

In Peru there is considerable talk of the establishment of a governmental refinery. While it is understood that negotiations are in progress, the outcome is too problematical for further discussion at this time.

The remarkable development of petroleum refining in Canada is already indicated in the increasing imports of crude oil into that country coincidental with decreased importations of gasoline and a constantly increasing gasoline consumption.

### Russian Exports

B. 3. Russian Petroleum Exports.—Russian oils exported to European markets which, as we have seen above, consume over 47 per cent of our total export of refined oils, have been an important factor in depressing export prices to their present low levels. This has resulted more from Russian export policy than the quantities involved. Oil represents 30 per cent of the value of all Russian exports, and for the fiscal year 1927 amounted to some 2,000,000 metric tons, or approximately one-fifth of the total Russian oil production. Approximately 10 per cent of Europe's petroleum consumption is now probably supplied from Russian sources.

The usual economic theory of petroleum exports is that export represents the surplus of domestic production over domestic demand, and so may be considered as a secondary although vital function of the petroleum industry. In practice Russian policy reverses this theory and export becomes a primary consideration of the oil industry.

Since the ratio of exports to production for the last five years has been approximately one to five under this condition, this ratio would seem to be the economic limit of Russian oil exports under the existing system of Russian economy. The increasing demands of domestic consumption tend to absorb any increases in total production.

### Russian Limitations

Among the factors which tend to prevent any radical change in the volume of Russian oil exports may be listed the inadequacy of refining, transportation and port facilities, which in turn follow upon the inability to so finance this state industry as to provide for its natural and progressive development. This status may, of course, be upset at any moment when and if petroleum credits to the Russian petroleum industry by foreign capitalists are granted. The fact that such a procedure would probably precipitate an international crisis would seem to act as but a slight deterrent.

While the probable volume of Russian oils to be exported in 1928 will be slightly in excess of 2,000,000 metric tons, the distribution of this oil is subject to political expediency rather than commercial economics and is consequently subject to abrupt changes.

For example we have seen that agitation for the establishment of a petroleum sales monopoly in Turkey proceeded hand in hand with negotiations for the exclusive utilization of Russian oils. A publicity campaign in England is being accompanied by sizable decreases in the importations of Russian oil. A large scale price war is being waged in India at present between American and British interests over the importation of Russian oil.

Russian oil exports are of such immediate vital concern to the Russian nation that it may safely be assumed that Russian oil displaced from one individual market will immediately be disbursed in others.

### Concerning Substitutes

B. 4. Petroleum Substitute.—There is considerable world discussion of the possibilities of petroleum substitutes such as the popularly known "oil from coal," shale oil and alcohol fuels. Of all, the Berges "oil from coal" process in Germany is the only one from which the actual commercial operations of the process gives promise of quantitative production.

Germany imports about 1,500,000 tons of liquid petroleum products annually, an amount that will increase progressively in coming years. The next year's production of oil from coal by the Leunawerke is not expected to exceed 100,000 tons. Further production contemplated Gesellschaft fuer Teerverwertung in a plant under construction at Duisburg-Meiderick will have an annual capacity of 50,000 tons. A speaker at the meeting of the German Society of International Economics in Berlin in November prophesied that in 10 years Germany will produce 2,500,000 tons of oil from coal annually, or enough to cover its then demand, this expansion to come from a plurality of plants to be laid during the decade.

### Foreign Production

B. 5. Increased Oil Production Outside of the United States.—Increasing oil production in South America and Irak promise first to displace American oil exports to South America and the Near East and the surplus to supersede a large portion of our exports to Europe, the Far East and Canada. While it may seem premature to discuss the effects of commercial production by the Turkish Petroleum Co. at this time, you perhaps have already noted that to a large degree the recent French legislative proposal for es-


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tablishing a tariff differential in favor of crude oil for domestic refining was based on the expectations of the French group participation in the Turkish Petroleum Co.

Production of South American countries in 1927 with a conservative estimate of probable production in 1928 are given below:

| | 1927 (bbls.) | 1928 (bbls.) |
|---|---|---|
| Venezula | 64,000,000 | 110,000,000 |
| Colombia | 14,600,000 | 20,000,000 |
| Peru | 9,900,000 | 10,000,000 |
| Argentine | 8,500,000 | 8,500,000 |
| Trinidad | 5,200,000 | 6,200,000 |
| Ecuador | 450,000 | 540,000 |
| | 102,650,000 | 154,240,000 |

**Foreign Co-ordination**

B. 6. Closer Co-ordination of Foreign Competition.—The two most important foreign competitors of American oil exporting organizations are the Royal Dutch Shell Group and the Anglo-Persian Oil Co., Ltd. The expansion and closer co-ordination of the two promises a greater economy and efficiency of operations which indicates a proportionately increased intensity of competition to American companies. The Royal Dutch interests have recently purchased the refinery property of John Fells, Ltd., in Australia, and the Columbia Oil Co. in New Jersey. The Anglo-Persian Oil Co., Ltd., has entered the Swedish market on a national scale. The Burmah Oil Co., Ltd., of Burmah, and the Asiatic Petroleum Co., Ltd., of India (Royal Dutch Shell), have recently merged their interests for India. The intimate association of the Ang'o-Persian Oil Co. and Royal Dutch Shell interests in the Turkish Petroleum Co. have been previously noted.

**Summary**

It is assumed for the purpose of this discussion that consumption of petroleum products abroad will continue at approximately its present rate and that our attention will be confined to those outstanding movements which promise to effect that proportion of the present foreign demand supplied by direct American petroleum exports.

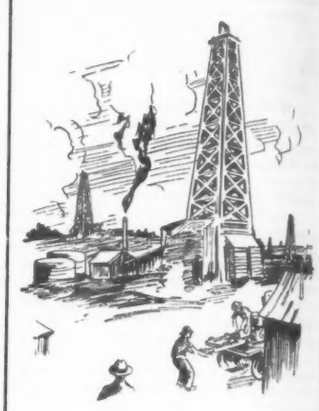
The year 1928 promises to develop marked changes in the volume and direction of United States export trade in petroleum products. In 1927 we have noted an increased volume of products exported simultaneously with sharp depreciations in values. In a large measure these greatly lowered values are a direct result of a world-wide excessive production of oil but of perhaps slightly less importance are the increasing sales of Russian oil abroad at prices and terms incompatable with the prevailing economic practices of practically all other countries.

This condition is further aggravated by excessive competition for export business among the large number of smaller refiners in the United States in times of overproduction which under present conditions in the export market amounts to an establishment of market at constantly lowered prices, while the actual business goes to a competitor operating under a unique form of national economy. The resulting prices in turn tend to depress domestic quotations.

**Sales Monopolies**

The tendency to sales monopolies for oil and the legislative control of the industry abroad has been noted. The effects on American exports are immediate and direct. To a large extent these monopolies are formed for reasons more political than economic. Supplies are usually drawn from those sources more intimately related to the monopo'y countries by politico-financial alliances without regard to the natural laws of supply and demand on the international market. Examples of this are seen in Turkey, Spain, Greece and possibly Italy, all of which under normal conditions have taken a large proportion of their petroleum requirements from the United States, but for which at present is substituted Russia and Rumania.

Excessive civil and military disturbances, as well as restrictive taxation in China, coupled with the present difficulties of rival marketing organizations in India, make any forecast for the world's two largest kerosene markets ex-

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ceedingly difficult. In the former a consumption progressively increasing for years is greatly retarded, and in the latter kerosene from hitherto American and Dutch East Indian sources is replaced to a large extent with Russian kerosene.

The greatly increased refining capacity of certain foreign countries, actual or under immediate consideration, notably in England, France, Germany, Venezuela and Spain, promises to give a greater international movement of crude oil largely at expense of United States exports of refined products.

American oil companies engaged in export trade have a foreign investment of American capital of approximately $1,500,000,000 devoted to this trade. It is perhaps needless to point out that the extended development abroad of nationalazation, sales monopolies and refining capacity will seriously restrict, if not jeopardize, the continued profitable employment of a large portion of that capital. There is also no small danger that the American petroleum industry may find itself with a tremendously overdeveloped refining capacity with its attendant exaggerated overproduction unless the above tendencies proceed at such a rate as to permit gradual adjustments rather than abrupt changes. These tendencies have proceeded at a greatly accelerated pace during the last year, a period marked by a general world overproduction of oil. The acceleration and increased intensity of these tendencies which would result from a period of decreased world production and the usual prophesies of early exhaustion can only be a matter of conjecture.

It may be interesting to note in passing that in all probability the exports of automobiles and accessories will exceed in value the export of petroleum products for the first time in 1928.

**Influence of Russian Oil**

The influence of Russian oil in the major export markets of the United States, chiefly Europe and the Far East, has contributed in no small measure to the present low levels of export prices. The critical condition of mechanical equipment of the Russian oil fields, further aggravated by inadequate transport and distributional facilities and the limited availability of foreign credits to improve these conditions make it exceedingly improbable that any great increases in export volume of Russian oils may be expected in the current year. However, any marked change in the present Soviet oil policy or the availability of any large amount of credits would tend to reverse this situation within a short period of time.

The sharp declines in prices of almost the entire range of petroleum products as a result of excessive crude oil production have minimized the incentive abroad to develop substitute products. While isolated instances of the limited use of alcohol fuels is noted, in few cases are these entirely satisfactory in present day types of internal combustion engines. Germany is the only country in which the actual commercial production of petroleum substitutes is now occurring. During 1928 it is expected that this production, by applying the well-known Bergius process to coal, will total somewhere between 100,000 and 150,000 metric tons of all products, an amount equal to but a portion of the annual increased consumption in Germany recorded during the past few years.

The greatly increased production of oil in South America, and the probable new large production expected in Irak through the activities of the Turkish Petroleum Co. will undoubtedly cause marked changes in the trend of our export trade. A possible counterbalance to this may be found in the increasing consumption of oil products abroad which may, of course, proceed at such a rate as to absorb the output of these new producing regions without abruptly displacing American exports.

**Intensified Competition**

Each of the factors above referred to as influencing the outlook for the export of United States petroleum products, and doubtless many others, are responsible for


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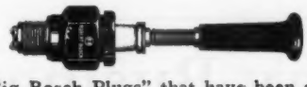

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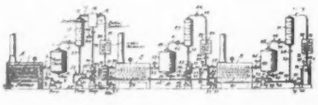
the intensified competition existing between large numbers of American refiners and exporters on the one hand and the greater co-ordination of interest on the part of our foreign competitors. Excessive competition among the American exporters might be alleviated by some form of co-operative exporting, possibly under the Webb-Pomerane Export Trade Act. Those tendencies which give most promise of their continued effect on oil exports are too widespread and of such magnitude that they apparently cannot be opposed successfully by our present forms of commercial organization.

I have pointed out, in the beginning of this paper, the difficulty of dealing with the subject at hand in a more detailed and accurate manner. One of the outstanding handicaps is the absence of accurate and complete consumption studies for individual petroleum products in foreign countries which are a necessary basis for any reliable forecast as to future expectations. Of equal importance would be the uniform, consistent and timely availability of trade statistics on the international trade in petroleum products. I believe that the publicity resulting from the wide disseminating of such statistics would prove exceedingly beneficial to the industry at large.

While these general trends to be expected in the petroleum export trade during 1928 indicate a far from attractive picture, it is the object of this paper merely to emphasize the importance of certain outstanding factors each in themselves deserving of more complete and exhaustive study than has heretofore been devoted to them.

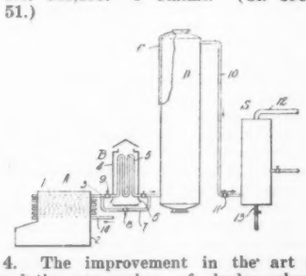
## Recent Patents

1,658,415. Process For Cracking Petroleum Oil. Robert T. Pollock, Boston, Mass., assignor to Universal Oil Products Co., Chicago, a corporation of South Dakota. Filed December 20, 1920. Serial No. 431,838. 3 Claims. (Cl. 196—49.)



1. A process of cracking oil, which consists in passing the oil through a heating coil wherein it is subjected to cracking conditions of heat and pressure, in discharging the oil from said coil into a vapor chamber, in passing the vapors from said vapor chamber through successive dephlegmators, in passing the reflux condensate from each of said dephlegmators under applied pressure to independent heating zones and in subjecting the reflux condensate passed to each of said independent heating zones to higher temperatures than the temperatures to which the oil is subjected in said heating coil.

1,656,724. Control of Pyrolytic Conversion. James Raymond Carringer, Hillside, N. J., assignor to Standard Oil Development Co., a corporation of Delaware. Filed May 28, 1923. Serial No. 641,895. 4 Claims. (Cl. 196—51.)



4. The improvement in the art of pyrolytic conversion of hydrocarbons, which comprises heating the oil to a cracking temperature, cracking said oil at said temperature, cooling said partially converted products to a lower temperature, and completing the conversion by digestion at said lower temperature.

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# Oklahoma-Kansas and Eastern Pipe Line Report

## OKLAHOMA-KANSAS

### Pipe Line Statement for December

#### Runs

| | Month | Dy. Av. |
|---|---|---|
| *Prairie Pipe Line Co. | 4,588,000 | 148,000 |
| Gulf Pipe Line Co. | 1,599,078 | 51,583 |
| Texas Pipe Line Co. | 1,399,930 | 45,159 |
| Magnolia Petroleum Co. | 2,037,196 | 65,716 |
| Empire Pipe Line Co. | 996,436 | 32,143 |
| Cosden Pipe Line Co. | 922,071 | 29,745 |
| Sinclair Pipe Line Co. | 2,755,257 | 88,879 |
| Oklahoma Pipe Line Co. | 3,524,893 | 113,706 |
| Other lines | 7,812,000 | 252,000 |
| Total December | 25,634,861 | 826,931 |
| Total November | 26,397,277 | 879,908 |
| Difference | 762,416 | 52,977 |

#### Shipments

| | | |
|---|---|---|
| †Prairie Pipe Line Co. | 5,344,811 | 172,413 |
| Gulf Pipe Line Co. | 1,430,717 | 46,151 |
| Texas Pipe Line Co. | 1,026,540 | 33,114 |
| Magnolia Pipe Line Co. | 1,919,704 | 61,926 |
| Empire Pipe Line Co. | 1,173,543 | 37,856 |
| Cosden Pipe Line Co. | 961,640 | 31,021 |
| †Sinclair Pipe Line Co. | 2,760,260 | 89,039 |
| Oklahoma Pipe Line Co. | 3,756,872 | 121,189 |
| *Other lines | 7,471,000 | 241,000 |
| Total December | 25,845,087 | 833,709 |
| Total November | 25,916,037 | 863,867 |
| Difference | 70,950 | 30,158 |

#### Stocks

| | |
|---|---|
| Prairie Oil & Gas Co. | 32,020,000 |
| Prairie Pipe Line Co. | 2,500,000 |
| Gulf P. L. Co. & Gypsy Oil Co. | 10,305,347 |
| The Texas Company | 6,034,332 |
| Magnolia Petr. Co. | 7,037,436 |
| Empire P. L. Co. | 4,400,438 |
| Cosden P. L. Co. | 3,365,765 |
| Sinclair Crude Oil Pur. Co. | 20,870,000 |
| Oklahoma P. L. Co. | 2,705,692 |
| Carter Oil Co. | 15,832,798 |
| Other lines | 11,600,000 |
| Total December | 116,671,808 |
| Total November | 114,952,561 |
| Difference | 1,719,247 |

*Estimated. †Prairie shipments include Texas crude oil and Sinclair shipments include Texas and Wyoming crude oil.

Note: Stocks do not include approximately 6,000,000 bbls. of crude oil held in storage on private tank farms and leases and 1,500,000 bbls. of Texas Panhandle crude oil in storage in Oklahoma and Kansas.

## EASTERN PIPE LINES

### Runs from Wells

In the following table will be found the regular receipts from wells by various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for November and December:

| | Nov., 1927 | Dec., 1927 |
|---|---|---|
| Nat. Transit | 138,601.66 | 135,509.47 |
| S. W. Pa. P. L. | 55,225.67 | 53,622.87 |
| Eureka P. L. | 364,642.37 | 357,137.02 |
| Buckeye P. L. (Macksb'g) | 314,900.41 | 317,414.13 |
| Buckeye P. L. Cleve.) | 12,030.90 | 11,590.15 |
| Buckeye P. L. (Lima, etc.) | 105,956.53 | 104,528.03 |
| Indiana P. L. | 7,189.17 | 7,062.60 |
| Cum'land P. L. | 236,613.60 | 236,646.39 |
| N. Y. Transit | 21,173.39 | 22,279.14 |
| Tidewater P. L. | 152,622.58 | 154,685.44 |
| Pure Oil | 152,816.95 | 100,041.39 |
| Emery P. L. | 56,468.37 | 56,312.05 |
| Paragon Dev. | 27,069.78 | 25,971.71 |
| Stoll Oil Ref. | 12,843.77 | 12,870.98 |
| Total | 1,718,256.14 | 1,645,673.31 |
| Daily average | 57,275.20 | 53,088.82 |

Note: Indian Refining Co. also reported other receipts of 207,806.71 bbls. Paragon Refining Co. had other receipts of 152,906.53 bbls. Paragon Development had other receipts of 1,398.77 bbls.

### Petroleum Deliveries

The following tables exhibit the shipments or regular deliveries of various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for November and December:

| | Nov., 1927 | Dec., 1927 |
|---|---|---|
| Nat. Transit | 319,056.21 | 432,663.76 |
| S. W. Pa. P. L. | 375,867.36 | 374,669.37 |
| Eureka P. L. | 192,438.78 | 194,894.42 |
| Buckeye P. L. (Macksb'g) | 152,462.55 | 134,693.87 |
| Buckeye P. L. (Cleve.) | 969.43 | 1,311.85 |
| Buckeye P. L. (Lima, etc.) | 1,013,132.41 | 846,994.35 |
| Indiana P. L. | 1,116,002.96 | 1,153,206.72 |
| Cum'land P. L. | 145,443.98 | 144,182.95 |
| N. Y. Transit | 175,265.57 | 141,302.60 |
| Northern P. L. | 178,350.74 | 176,227.13 |
| Tidewater P. L. | 111,596.30 | 155,569.28 |
| Pure Oil | 177,134.58 | 123,788.25 |
| Emery P. L. | 54,750.52 | 56,494.34 |
| Paragon Ref. | 168,246.24 | 150,525.40 |
| Indian Ref. | 319,181.35 | 363,972.95 |
| Paragon Dev. | 29,362.95 | 28,229.67 |
| Total | 4,529,262.92 | 4,479,636.91 |
| Daily average | 150,975.46 | 144,504.42 |

### Gross Stocks

The gross stocks held by various pipe lines in the oil-producing sections of New York, Pennsylvania, West Virginia, Ohio, Indiana and Kentucky at the close of November and December:

| | Nov., 1927 | Dec., 1927 |
|---|---|---|
| Nat. Transit | 1,108,601.66 | 1,187,950.23 |
| S. W. Pa. P. L. | 715,534.91 | 739,481.15 |
| Eureka P. L. | 1,729,737.61 | 1,702,403.70 |
| Buckeye P. L. (Macksb'g) | 396,287.93 | 435,355.19 |
| Buckeye P. L. (Cleve.) | 50,691.02 | 41,685.80 |
| Buckeye P. L. (Lima, etc.) | 4,695,838.16 | 4,943,834.32 |
| Indian P. L. | 647,290.51 | 644,486.85 |
| Cum'land P. L. | 594,822.46 | 614,861.45 |
| Southern P. L. | 386,756.90 | 409,629.89 |
| N. Y. Transit | 510,190.02 | 509,588.23 |
| Northern P. L. | 547,199.31 | 537,115.66 |
| Pure Oil | 394,386.96 | 369,284.08 |
| Emery P. L. | 12,543.82 | 1,686.27 |
| Paragon Ref. | 13,179.46 | 15,272.42 |
| Indian Ref. | 129,402.33 | 71,648.15 |
| Paragon Dev. | 7,376.68 | 6,009.77 |
| Total | 11,939,740.93 | 12,340,297.25 |
| Decrease | 107,919.71 | |
| Increase | | 400,556.32 |

### Grades of Oil

The following table shows the amount of the different grades of oil held by the Eastern pipe lines at the close of November and December, showing the gross stocks of the above fields:

| | Nov., 1927 | Dec., 1927 |
|---|---|---|
| Penn'a | 4,076,710.10 | 4,225,582.93 |
| Lima | 1,177,864.75 | 1,196,691.27 |
| Kentucky | 1,089,857.44 | 1,009,560.04 |
| Mid-Continent | 5,619,125.98 | 5,855,777.40 |
| Illinois | 76,182.66 | 52,685.61 |
| Total | 11,939,740.93 | 12,340,297.25 |

### Daily Average Runs

The following table shows the daily average runs of the Pennsylvania, Lima and Kentucky oil fields for the past four years:

| | 1924 | 1925 | 1926 | 1927 |
|---|---|---|---|---|
| Jan. | 62,638 | 56,831 | 55,630 | 56,209 |
| Feb. | 68,023 | 60,606 | 60,394 | 61,298 |
| Mar. | 68,721 | 60,575 | 61,644 | 63,247 |
| April | 71,058 | 63,062 | 63,019 | 60,337 |
| May | 63,943 | 59,217 | 60,580 | 60,284 |
| June | 63,230 | 61,270 | 64,131 | 62,757 |
| July | 64,208 | 62,639 | 63,206 | 58,574 |
| Aug. | 59,942 | 59,686 | 61,815 | 60,870 |
| Sept. | 62,930 | 63,510 | 64,639 | 60,285 |
| Oct. | 64,976 | 60,995 | 62,704 | 57,499 |
| Nov. | 56,282 | 59,350 | 61,774 | 57,275 |
| Dec. | 55,814 | 57,974 | 58,755 | 53,089 |

### Daily Average Shipments

The following table gives daily average shipments from the Pennsylvania, Lima and other fields for the past four years:

| | 1924 | 1925 | 1926 | 1927 |
|---|---|---|---|---|
| Jan. | 145,518 | 157,889 | 156,056 | 141,227 |
| Feb. | 148,732 | 160,863 | 159,488 | 138,534 |
| Mar. | 147,098 | 154,591 | 150,239 | 133,777 |
| April | 147,611 | 151,429 | 152,371 | 140,227 |
| May | 134,997 | 146,995 | 160,998 | 144,394 |
| June | 143,010 | 149,467 | 160,257 | 149,772 |
| July | 124,187 | 161,338 | 160,005 | 151,350 |
| Aug. | 123,129 | 161,730 | 151,929 | 138,953 |
| Sept. | 127,325 | 156,719 | 158,915 | 144,213 |
| Oct. | 123,170 | 145,288 | 151,132 | 147,036 |
| Nov. | 124,400 | 143,582 | 152,668 | 150,975 |
| Dec. | 151,392 | 150,162 | 136,428 | 144,504 |

### Gross Stocks

In the following table will be found the gross stocks of the various lines of the Pennsylvania, Lima and Kentucky oil fields, including oil received from other lines at the close of each month for the past three years:

| | 1925 | 1926 | 1927 |
|---|---|---|---|
| Jan. | 11,353,276 | 9,859,170 | 9,718,000 |
| Feb. | 11,192,924 | 9,579,354 | 10,119,000 |
| Mar. | 11,158,297 | 9,438,293 | 10,794,000 |
| April | 11,062,082 | 9,805,851 | 11,112,000 |
| May | 11,207,562 | 9,531,757 | 11,369,000 |
| June | 11,093,796 | 9,585,904 | 11,492,000 |
| July | 11,067,453 | 9,734,687 | 11,463,000 |
| Aug. | 10,974,481 | 9,168,947 | 11,985,115 |
| Sept. | 10,781,753 | 9,433,732 | 12,313,716 |
| Oct. | 11,086,850 | 9,259,806 | 12,667,661 |
| Nov. | 11,068,158 | 9,257,667 | 11,939,740 |
| Dec. | 10,458,445 | 9,454,512 | 12,340,297 |

### Franklin Pipe Line Co.

The following table exhibits the condition of the Franklin Pipe Line at the close of business for the months named and not counted in the stocks and averages reported above:

| 1926— | Runs | Shipments | Stocks |
|---|---|---|---|
| Nov. | 2,810.60 | 1,664.55 | 15,917.31 |
| Dec. | 2,847.52 | 5,561.11 | 13,193.72 |
| 1927— | | | |
| Jan. | 2,641.54 | 1,470.42 | 14,374.84 |
| Feb. | 2,764.30 | 1,082.82 | 15,956.32 |
| Mar. | 2,587.20 | 1,878.56 | 16,664.96 |
| April | 2,834.23 | 1,512.65 | 17,986.54 |
| May | 2,768.40 | 539.29 | 20,215.73 |
| June | 2,946.29 | 664.49 | 22,497.61 |
| July | 3,153.39 | 1,276.61 | 24,374.39 |
| Aug. | 3,057.89 | 1,713.11 | 25,718.17 |
| Sept. | 3,309.56 | 2,656.48 | 26,372.25 |
| Oct. | 2,801.32 | 1,226.99 | 28,946.58 |
| Nov. | 2,746.50 | 2,220.53 | 32,472.55 |

### The Illinois Field

The following table gives the report of the Illinois Pipe Line Co. in Illinois:

| | |
|---|---|
| Gross stocks, Jan. 1 | 1,966,012.03 |
| Other receipts | 550,328.32 |
| Runs from wells | 187,502.31 |
| Regular deliveries | 352,391.54 |
| Other deliveries | 511,336.17 |

The amount of Illinois oil run by the Tide Water Pipe Co. in December was 26,496.03 bbls. and deliveries were 44,784.53 bbls. Adding these figures to those of the Illinois Pipe Line Co. makes the runs and deliveries as follows:

| 1926— | Runs | Deliveries |
|---|---|---|
| Dec. | 668,909.58 | 587,947.61 |
| 1927— | | |
| January | 631,421.03 | 530,085.91 |
| February | 596,831.16 | 476,950.71 |
| March | 737,593.91 | 554,947.43 |
| April | 593,225.97 | 444,818.49 |
| May | 728,759.40 | 543,152.03 |
| June | 640,975.85 | 532,217.72 |
| July | 613,901.30 | 494,902.53 |
| August | 651,276.40 | 529,321.37 |
| September | 619,589.49 | 432,212.49 |
| October | 601,099.25 | 408,287.53 |
| November | 605,621.14 | 416,185.96 |
| December | 577,321.25 | 397,176.97 |

Tide Water Pipe Co., Ltd., also delivered in December 111,513.09 bbls. of Oklahoma oil.

## AVERAGE DAILY RECEIPTS OF CALIFORNIA OIL AT ATLANTIC AND GULF COAST PORTS

| Average bbls. per day— | ATLANTIC PORTS | | | | | | GULF COAST PORTS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baltimore | Boston | New York | Philadelphia | Others | Total | Galveston | New Orleans Baton Rouge | Port Arthur Sabine Pass | Tampa | Total | Total All Ports |
| August | 18,616 | 3,065 | 48,129 | 17,323 | 26,000 | 113,033 | ..... | .... | ..... | ..... | ..... | 113,033 |
| September | 23,033 | 6,967 | 51,400 | 14,567 | 19,533 | 115,500 | .. | .... | ..... | ..... | .. .. | 115,500 |
| October | 30,936 | 4,355 | 47,964 | 14,139 | 14,387 | 101,774 | .. | .... | ..... | ..... | .. .. | 101,774 |
| November | 9,433 | 3,833 | 22,033 | 15,166 | 4,333 | 55,400 | .. | .... | ..... | ..... | .. .. | 55,400 |
| December | 10,742 | 3,033 | 30,258 | 24,387 | 7,065 | 75,484 | .. | .... | ..... | ..... | 3,613 | 79,097 |

## AVERAGE DAILY IMPORTS OF PETROLEUM AT PRINCIPAL UNITED STATES PORTS

| Average bbls. per day— | ATLANTIC PORTS | | | | | | GULF COAST PORTS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Baltimore | Boston | New York | Philadelphia | Others | Total | Galveston | New Orleans Baton Rouge | Port Arthur Sabine Pass | Tampa | Total | Total All Ports |
| August | 19,323 | 9,032 | 80,903 | 14,258 | 31,821 | 155,387 | 2,097 | 21,161 | ..... | ..... | 23,258 | 178,645 |
| September | 28,933 | 11,433 | 85,500 | 12,800 | 37,700 | 175,467 | 5,667 | 19,233 | .... | 3,600 | 28,500 | 203,967 |
| October | 36,064 | 13,097 | 79,355 | 3,838 | 34,097 | 166,451 | 1,613 | 19,323 | 806 | 1,871 | 23,613 | 190,064 |
| November | 35,233 | 8,033 | 84,533 | 30,100 | 27,067 | 184,967 | 4,666 | 28,500 | 2,000 | 1,667 | 24,167 | 219,133 |
| December | 39,968 | 2,387 | 78,968 | 19,097 | 29,836 | 170,258 | 2,580 | 15,256 | 839 | 1,226 | 20,000 | 190,258 |

## GROSS PRODUCTION IN UNITED STATES FOR 12 MONTHS (REVISED)

(In Barrels)

| 1927— | | California | Oklahoma | Texas | Kansas | Arkansas | Louisiana | Rocky Mountains | Eastern Fields | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| January: | Month | 20,184,872 | 19,035,426 | 18,565,156 | 3,769,879 | 4,076,469 | 1,945,777 | 2,648,920 | 3,332,500 | 73,558,999 |
| | Daily average | 651,125 | 614,046 | 598,876 | 121,609 | 131,499 | 62,767 | 85,449 | 107,500 | |
| February: | Month | 17,982,711 | 19,752,348 | 16,425,416 | 3,352,076 | 3,574,256 | 1,842,400 | 2,439,864 | 3,007,200 | 68,376,271 |
| | Daily average | 642,240 | 705,441 | 586,622 | 119,717 | 127,652 | 65,800 | 87,138 | 107,400 | |
| March: | Month | 19,835,724 | 22,480,921 | 18,179,491 | 3,675,143 | 3,853,920 | 2,086,108 | 2,684,724 | 3,335,800 | 76,131,831 |
| | Daily average | 639,862 | 725,191 | 586,435 | 118,553 | 124,320 | 67,294 | 86,604 | 105,100 | |
| April: | Month | 19,493,825 | 22,208,130 | 17,755,920 | 3,516,930 | 3,378,240 | 2,039,550 | 2,671,830 | 3,474,000 | 74,538,425 |
| | Daily average | 649,794 | 740,271 | 591,864 | 117,231 | 112,608 | 67,985 | 89,061 | 115,800 | |
| May: | Month | 19,506,054 | 23,258,463 | 19,489,607 | 3,704,314 | 3,493,669 | 1,984,651 | 2,682,151 | 3,467,000 | 77,585,909 |
| | Daily average | 629,228 | 750,273 | 628,697 | 119,494 | 112,699 | 64,021 | 86,521 | 111,839 | |
| June: | Month | 19,181,442 | 22,830,330 | 18,360,450 | 3,437,580 | 3,365,760 | 1,920,180 | 2,634,570 | 3,330,000 | 75,060,312 |
| | Daily average | 639,381 | 761,011 | 612,015 | 114,586 | 112,192 | 64,006 | 87,819 | 111,000 | |
| July: | Month | 19,319,021 | 26,522,546 | 17,580,348 | 3,454,082 | 3,406,683 | 2,311,019 | 2,678,679 | 3,363,300 | 78,635,679 |
| | Daily average | 623,194 | 855,566 | 567,108 | 111,422 | 109,893 | 74,549 | 86,409 | 108,484 | |
| August: | Month | 19,279,131 | 26,283,350 | 17,682,927 | 3,442,240 | 3,242,600 | 2,231,202 | 2,489,021 | 3,571,000 | 78,221,471 |
| | Daily average | 621,907 | 847,850 | 570,417 | 111,040 | 104,600 | 71,974 | 80,291 | 115,194 | |
| September: | Month | 19,064,500 | 24,111,660 | 19,322,800 | 3,341,340 | 3,032,970 | 2,027,070 | 2,268,630 | 3,465,000 | 75,633,970 |
| | Daily average | 635,483 | 803,722 | 610,760 | 111,378 | 101,099 | 67,569 | 75,621 | 111,774 | |
| October: | Month | 19,448,893 | 24,247,052 | 19,200,098 | 3,509,169 | 3,117,298 | 2,058,889 | 2,258,885 | 3,400,000 | 77,240,285 |
| | Daily average | 627,384 | 782,163 | 619,358 | 113,199 | 100,555 | 66,416 | 72,867 | 109,677 | |
| November: | Month | 18,516,467 | 23,083,380 | 18,628,290 | 3,313,650 | 2,906,760 | 1,956,960 | 2,234,730 | 3,302,500 | 73,943,737 |
| | Daily average | 617,216 | 769,446 | 620,943 | 110,455 | 96,892 | 65,232 | 74,491 | 110,083 | |
| December: | Month | 18,938,823 | 22,208,417 | 19,840,009 | 3,427,174 | 2,962,750 | 1,927,148 | 2,400,578 | 3,219,900 | 74,924,799 |
| | Daily average | 610,930 | 716,400 | 640,000 | 110,554 | 95,576 | 62,166 | 77,438 | 103,868 | |
| | Total 12 months | 230,751,462 | 276,022,024 | 220,030,512 | 41,943,577 | 40,411,375 | 24,330,954 | 30,092,582 | 40,268,200 | 903,850,687 |
| | Daily average | 633,196 | 756,225 | 602,823 | 114,914 | 110,716 | 66,660 | 82,445 | 110,324 | 2,476,303 |

# PREPAREDNESS

THE Navy is the mobile, the quick moving section of American defense. At the slightest indication of trouble a ship or a fleet is rushed to the scene.

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This compressor is ideal for field air-lift. A complete unit on a single base, it is easily transported, can be installed on timbers until the response of the wells has been assured—and if the response is satisfactory is then highly efficient for use in a permanent installation.

A permanent field air-lift plant composed of CLARK Verticals is shown in the photograph above. An added value, however, lies in the fact that it is not necessary to make installations permanent. Set in the open on timbers, CLARK Portables will give surprisingly efficient service over long periods.

The engine is 4-cylinder, vertical, 75 H.P., burning natural gas. Compressor has two vertical cylinders, each 2-stage, and handles 330,000 cu. ft. of air in 24 hours, at 0 pounds intake to 400 pounds discharge. Air or friction starter is optional.

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